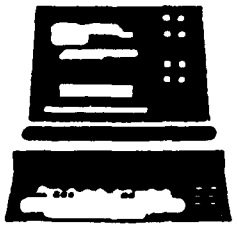

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US Army Information Systems Engineering Command
Fort Huachuca, AZ 85613-5300

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IN MANAGEMENT INFORMATION,
COMMUNICATIONS, AND COMPUTER SCIENCES
(AIRMICS)

APPLICATION OF ELECTRONIC MEETING SYSTEMS TO MILITARY ORGANIZATIONS

(ASQBG-A-89-031)

June, 1989

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115 O'Keefe Building
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This report documents and categorizes representative Electronic Meeting Systems, (EMS) enviroments to serve as a foundation for the effective application of these systems in military organizations. Aspects of system information (name, organization, category, cost, contact name), background (objective, history, future outlook), characteristics (tasks supported, facility, procedures and facilitation, software and hardware), and references for each system identified are included. Special attention is given to activities at the University of Arizona as an example of a mature EMS enviroment. Key issues associated with effective EMS application in military organizations are identified. The report concludes with a general EMS bibliography. Visits and tasks at military organizations in conjuction with site visits and agendas of demonstration using EMS software and facilities are appended.

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THIS REPORT HAS BEEN REVIEWED AND IS APPROVED

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APPLICATION OF ELECTRONIC MEETING SYSTEMS

TO MILITARY ORGANIZATIONS

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INTRODUCTION

Automated support for groups is beginning to receive the same type of attention that personal computing received approximately eight years ago. Personal computing is now widely accepted and institutionalized in organizations of all sizes, complementing existing data processing capabilities. Now, hardly a week goes by without some mention of automated support for groups in the trade literature (e.g., ComputerWorld, June 5, 1989) or the popular press (e.g., Business Week, June 5, 1989). This area has been labeled with a variety of names including Group Decision Support Systems (GDSS), Group Support Systems, Groupware, Computer Supported Collaborative Work (CSCW), Group Deliberation Support Systems, and Group Process Support Systems. Each label represents a somewhat different perspective of the application domain.

We have chosen the term Electronic Meeting Systems (EMS) to represent the spirit and convergence of these perspectives. We define EMS as:

> An information technology-based environment that supports group meetings, which may be distributed geographically and temporally. The IT environment includes, but is not limited to, distributed facilities, computer hardware and software, audio and video technology, procedures, methodologies, facilitation, and applicable group data. Group tasks include, but are not limited to , communication, planning, idea generation, problem solving, issue discussion, negotiation, conflict resolution, systems analysis and design, and collaborative group activities such as document preparation and sharing.

The purpose of this report is to document and categorize representative EMS environments to serve as a foundation for the effective application of these systems in military organizations. Aspects of system information (name, organization, category, cost, contact name), background (objective, history, future outlook), characteristics (tasks supported, facility, procedures and facilitation, software and hardware), and references for each system identified are included. Special attention is given to activities at the University of Arizona and associated corporate experiences as examples of mature EMS environments. The report concludes with a general EMS bibliography.

EMS TAXONOMY

We have chosen group size, group proximity, and time dispersion as three especially important dimensions to classify electronic meeting system environments. Each of these dimensions is subdivided as illustrated in Figure 1 to facilitate taxonomy development.

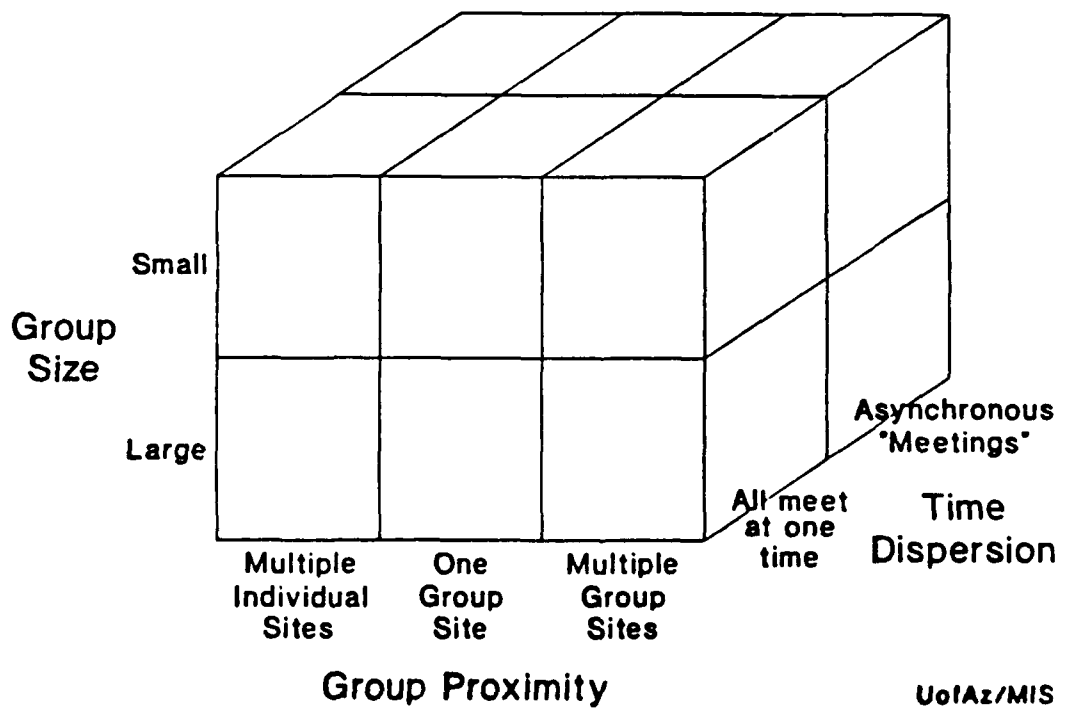


Figure 1.

Group size (subdivided in Figure 1 as large or small) is a relative concept. Most of us would agree, though, that a group of 3 or 4 members is small while a group of 20 or more is large. Note, however, that a distinction can also be made between the physical size of a group and its "logical" size. A physically large group from a common culture that has met repeatedly on a task may have a high degree of overlapping domain knowledge that results in the group being "logically" small. Conversely, a physically small multi-cultural group exhibits characteristics of a much larger group with multiple and often conflicting perspectives, points of view, diverse knowledge domains, and opinions. As such, it is "logically" large. For the purposes of this report, we are considering only the physical size of the group that is typically supported in each of the EMS environments discussed and consider groups of size 10 or less to be small with those greater than 10 to be large.

Group proximity refers to a single group in the sense that the all participants are addressing the same task. Not all participants need to be present in the same physical location (i.e., part of one physical group). Group proximity as illustrated in Figure 1 has three levels that describe the degree of geographic dispersion. The first — multiple individual sites — is indicative of situations in which the individual group members are working in their individual offices. The second — one group site — reflects the situation in which all members are in the same place at the same time, e.g., a face to face environment supplemented by computer support. The third — multiple group sites — represents those situations in which members of the group meet in separate locations in subgroups which are electronically linked with a combination of audio, video, and data channels e.g., teleconferencing combined with additional computer-based support.

The time dimension recognizes that groups may meet synchronously (i.e., at the same time) or asynchronously (i.e., at different times). An important distinction between EMS environments and traditional face to face meetings is removal (when appropriate) of the constraint of requiring everyone to be in the same meeting room at the same time. Existing electronic mail and computer conferencing are primitive examples of this capability. However, these technologies lack much of the group dynamic that accompanies a successful meeting. Capturing the essence of a successful meeting that arises as a result of participant synergism and simultaneous exchange under conditions where members not are all participating at the same time is a challenge. One intermediate possibility, however, exists under conditions where a larger session can be envisioned as a linked set of subgroup sessions, each of which is conducted in a synchronous fashion, even though the overall group appears to be operating in an asynchronous mode. In this situation the focus becomes more of how to integrate information effectively across sessions and between subgroups.

EMS ENVIRONMENTS

The purpose of this section is to present examples of Electronic Meeting Systems (EMS) environments to illustrate the application of the taxonomy presented in Figure 1. The category labels (Decision Room, Legislative Session, EMS Teleconference, EMS Teleconference/Broadcast, Local Area Decision Net, Computer Conference) are those most commonly associated with each category which, in turn, can be used either synchronously (all members meeting at the same time) or asynchronously. The examples included in this report for each category have been chosen as illustrations based on the authors' perceptions and information gathered from numerous sources. The intent is to provide

salient EMS examples, not to comprehensively review all incidences of electronic meeting systems. Details associated with each of the environments are included in later sections of this report.

DECISION ROOM

Decision rooms represent that EMS environment characterized by a facility intended to support small groups (typically of size 4 to 12) where the participants all meet in one place at one time. Such a decision room typically contains a series of networked computer workstations with software that complements face to face discussion plus some form of large front screen or group feedback capability. Examples of EMS in this sector include facilities at the University of Arizona (Nunamaker, Applegate, and Konsynski, 1987), Claremont College (Gray, 1989), Co-Lab (1987), Capture Lab (Mantei, 1989) and the University of Minnesota (Zigurs, Poole, and DeSanctis, 1988), MCC (Cook, et al., 1987), Group Technologies Corporation (Wagner and Nagasundaram, 1988), POD (Seward, 1987), Decision Technologies Group (Quinn and Rohrbaugh, 1985), and Metapraxis as well as facilities established internally at IBM (Nunamaker, et al., 1989).

All IBM and University facilities noted here as well as a number of other educational institutions in the U.S., Canada, and Mexico have University of Arizona software available recognizing that several facilities such as the University of Minnesota (SAMM) and Claremont also have additional commercial and proprietary group software. Each facility has its own focus and vision that to some extent dictates the functionality provided. POD, for example, has computer-based support for decision modelling but emphasizes facilitation without individual workstation support to elicit group participation. The Decision Technologies Group also uses modelling software on a single

workstation accompanied by facilitation of group sessions in a more traditional decision conference fashion. Mindsight by Execucom and Metapraxis come more from an individual executive support system perspective as opposed to a group orientation with facilitator involvement.

Differences as well exist for those systems that provide individual workstation support. Some software is primarily directed toward support for small homogeneous cooperative work groups e.g., Co-Lab while other software e.g., U. of Arizona, originated to support larger task forces that may have internal conflicts, strongly vested interests, private agendas, and multiple perspectives in addition to striving towards a shared objective. Although no facilities or product are yet available, Brainstorm, Inc. intends to support decision making meetings by providing specific task-oriented software (e.g., modelling) in an overall group work environment with a focus on decision making that requires input from a medium-sized group over a substantial period of time. Group Technologies Corporation emphasizes pre-planning and post-session software as well as software support during the meeting. MCC emphasized support for analysis and design teams. Other work e.g., Capture Lab emphasizes room design issues.

Other decision room differences exist in type of hardware support and operating systems. NEGO provides formal modelling support for negotiation using two personal computers or a mainframe. Options Technologies uses a single portable workstation plus individual voting pads. The University of Minnesota SAMM system uses a Unix based mini-computer with individual terminals. However, the noted differences and distinctions between various decision room systems are blurring with time through extended software functionality and integration with additional organizational information systems. Also, in addition to supporting

groups with participants all meeting at the same time, decision rooms can be used to support asynchronous meetings. For example, pre-recorded comments from some participants or different members wandering in and out of a longer session constitute a degree of asynchronous support. This use, however, is much the exception as opposed to the norm.

LEGISLATIVE SESSION

A legislative session differs from a decision room in size and degree of audio visual support. The larger size supported often necessitates a more "tiered" layout of the room. Verbal communication is complemented by computer supported interaction accompanied by additional focus on presentation support. The best known example of this type of facility known to the authors is at the University of Arizona (Dennis, et al., 1988). Here, a second facility has become operational (building on experiences with the first) extending group support capability to up to 48 members using 24 workstations. Two large screen projectors provide feedback to the group in conjunction with use of the software tools as well as presentation support for a wide variety of visual sources including video tapes, video disks, and television channels.

Like a decision room, a legislative room can be used for situations in which the participants are not all present at the same time e.g., pre-recorded comments from some participants or different members wandering in and out of a longer session, or a remote hookup for one or two group members. This use, however, is much the exception as opposed to the norm.

EMS TELECONFERENCE

EMS teleconferencing facilities are useful when a small group meets at several separate group sites at the same time. Here, the decision rooms holding the

various segments of the group are linked with teleconferencing support. As such video and audio channels are used to replace the face to face communication (both verbal and non-verbal) that would occur in the context of a single larger decision room. Examples of systems in this category include the Multimedia Conferencing Project (Crowley and Forsdick, 1989), Media Spaces, and Commune (Bly, 1988).

Each of these systems has differing objectives. None are commercial products. The objective of the Multimedia Conferencing Project has been to develop and test a system for realtime, multisite conferencing using audio, video, and shared workspace technology with a focus on creating a virtual meeting environment to supplement face-to-face communication. The objective of Mermaid (Multiple Environment for Remote Multiple Attendee Interactive Decision-making) is to support collaborative work among multiple participants in a distributed office environment. The system is aimed at providing integrated support for both asynchronous interaction-based personal work and simultaneous interaction-based cooperative work.

Both Media Spaces and Commune are products (albeit not commercially available) of Xerox PARC resulting from research relating to technology used to support collaborative design work. The objective of the Media spaces research is to develop a collection of environments to enhance real-time communications among designers through extensive use of video technology. Although motivated by a focus on design as a communication activity, the tool can support a variety of meeting tasks for dispersed groups. The objective of Commune is to support shared drawing in remote settings based on researcher observation that there is a need to support for an electronic tool to allow two or more remote users to write on the same surface at the same time.

No examples of commercially available systems known to the authors have been exclusively designed to support the EMS teleconference environment for multiple groups meeting at the same time but in different places. Software developed for use in the context of a single decision room has, however, been successfully demonstrated to work in this domain albeit supplemented by additional video channel and audio system support. Multiple individual sites are currently supported effectively in an asynchronous mode with information integrated across sessions and between groups. As such there exists a common "organizational memory" that all facilities are drawing from based on the accumulated contribution of numerous groups having met over some period of time in conjunction with a particular project (Valacich, Vogel, and Nunamaker, 1988). This capability also is present, of course, for decision rooms and legislative sessions.

EMS TELECONFERENCE/BROADCAST

Electronic Meeting Systems can also be used for multiple group sites meeting at the same time with a teleconference/broadcast emphasis. Systems of this type are often accompanied by audio feedback to the source e.g., questions to the presenter. Additional support is supplied for asynchronous meetings e.g., taped delay to compensate for world wide time differences. Perhaps the best known operational examples of systems of this type are those used primarily for educational purposes, both private and public, where courses or special presentations are broadcast to large numbers of geographically distributed locations.

LOCAL AREA DECISION NET

A local area decision net is used to support a small group of dispersed individuals working at different sites (such as their offices). Note particularly that a local decision net may be used with groups meeting all at the same time or asynchronous meetings where participants are working independently. Examples that fit this category include the Coordinator by Action Technology, Agenda by Lotus, Syzygy by Information Research Corporation, ForComment by Broderbund Software, LIFE by Motorola Computer Systems, WordPerfect Office by WordPerfect Corporation, Office Works by Data Access Corporation, Higgins by Conetic Systems, and Converse.

Some of these local area decision net systems are extensions of electronic mail and calendaring support. Coordinator is essentially an extension of a network based electronic mail system that is used for a variety of message and project management activities in conjunction with conversation structuring. Agenda is essentially an extension of calendaring that provides personal information management support for free-form textual data e.g., lists, notes, reminders, and addresses. Higgins supports scheduling, personal calendaring, data retrieval, and project tracking. Office Works is intended to handle calendaring as well as phone and electronic communication. LIFE-Plans supports spreadsheets while LIFE-lines is a workgroup E-mail system. Syzygy by Information Research Corporation is a combination calendaring and project management build on top of e-mail. Converse allows split-screen interactive communication among two or three participants.

Other local area decision net systems tend to be more oriented to shared document preparation as an extension of word processing. ForComment by Broderbund Software, Inc. is intended to facilitate collaborative writing.

WordPerfect Office extends the very popular WordPerfect word processor to include support for inter-office communication by allowing network users to exchange mail, phone messages, and appointment schedules as well as notetaking functions.

Note, however, that many software tools developed for use in decision rooms e.g. U of Arizona software, can be used effectively in local area net environments (Jessup, Tansik, and Lasse, 1988). Such tools can be used independent of reliance on decision room capabilities such as group screens through the effective use of windows and function access to information that might otherwise be displayed for the group in the decision room on a single front screen. Facilitation associated with decision rooms also can be dispersed to multiple sites through audio connections or additional windows. The intent is to preserve the dynamics of face-to-face communication as much as possible in geographically dispersed modes of operation.

COMPUTER CONFERENCE

In the context of EMS, computer conferencing provides the opportunity to transmit information from a single source to a large number of recipients. Although use in this fashion is more typically asynchronous, there is nothing to prevent essentially an on-line conference in which a large group of people are simultaneously contributing to various streams of thought in a conference context. Examples in this category include New Jersey Institute of Technology (NJIT) Systems (i.e., EIES, EIES2, and TEIES), Cosmos, and Caucus.

The goal of the EIES work at NJIT has been to develop computer conferencing systems to facilitate communication among geographically dispersed groups of people who need to communicate cheaper, faster, and more productively than with

telephone, mail, and conventional meetings (Turoff and Hiltz, 1982, 1985). Although still under development, Cosmos is intended to support a variety of group tasks such as meetings, project work, and company procedures with a focus based on a thorough understanding of how people communicate via messaging systems (Cosmos, 1988). A message delivery service coordinates the inflow and outflow of messages. The objective of Caucus is to facilitate efficient computer conferencing across geographic boundaries on many subjects. More traditional electronic mail is also supported.

APPLICATION TO MILITARY ORGANIZATIONS

The previous section presented examples of EMS in six categories based on dimensions of size, geographic proximity, and temporal dispersion. An important point in association with application of EMS is to recognize when to suggest meeting in the same room and/or at the same time versus those situations in which these constraints can be relaxed. Overall, the objective is to provide seamless integration between the various environments such that a group can more closely "have it their way" in terms of the appropriate time and place to hold a meeting that may be independent of geographic and temporal constraints imposed on the group membership without losing face-to-face meeting effectiveness. These opportunities cannot be successfully attained, however, without an appreciation of application issues and implications.

There are numerous issues in terms of effective EMS application in military organizations. These include commitment, sponsorship, dedicated facilities, communication/liaison, training, and managing expectations. Each of these issues will be discussed in turn.

*** Commitment is based on clarification, communication and "buy-in" of a shared vision. The need for demonstrations and use of a system by military organization members prior to installation to develop support and obtain sufficient resources for effective project completion should not be underestimated. Also included is the need to address "real" organizational problems and otherwise meet organization needs and objectives e.g., reducing time spent in meetings.

*** Sponsorship is crucial to EMS success on both senior and operating levels. Senior sponsorship responsibilities include approving time schedules, monitoring progress, providing high level feedback, and championing the system to end users. Operating sponsorship is particularly helpful to provide quick feedback and assistance in achieving implementation objectives. The time required for implementation combined with increasingly sophisticated applications and data management problems encourages a team approach.

*** Dedicated Facilities with attention to aesthetics and user comfort are extremely important to successful EMS implementation. Facilities that look like laboratories or training rooms with EMS installed as an afterthought rather that a commitment tend to invoke poor response from senior users. Facilities designed with EMS in mind can precipitate a variety of uses extending beyond planning and decision-making support.

*** Communication and Liaison is a key element in implementation responsiveness. Iteration as a philosophy is critical to meet the

evolving needs and desires of an organization during implementation. The "newness" of EMS to organizations coupled with the implementation team's unfamiliarity of the implementation team with organization operations combine to preclude the possibility of a comprehensive implementation prescription. Periodic changes, and evolutionary strategies are a way of life in EMS implementation.

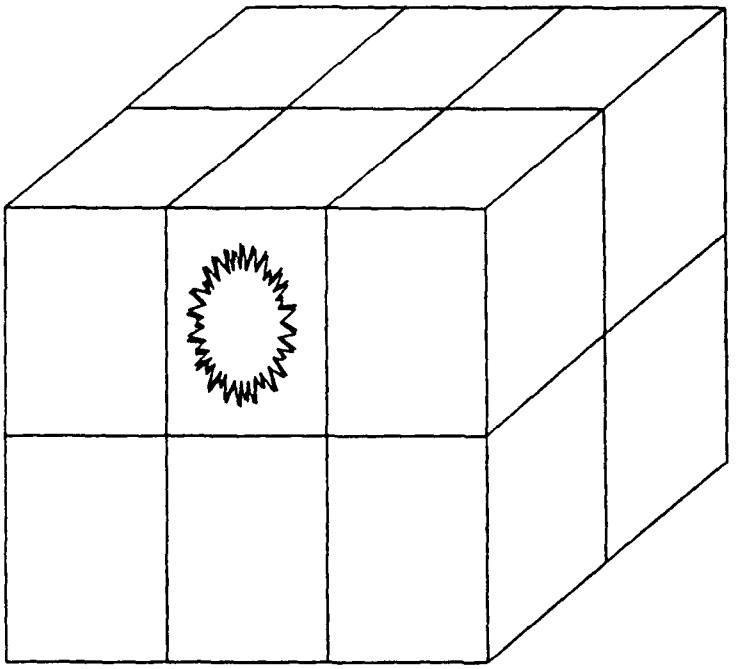
*** Training is necessary for organizational personnel at technical, facilitation, and end-user levels. Each area has its own interests and needs. Storyboards and "hands-on" use of the technology is particularly helpful as training aids to complement traditional documentation and tutorials. Transfer of control to site personnel is essential to assure that the system truly becomes used by those for whom it was intended. The process begins by overlapping support with both the implementation team and site personnel followed by implementation team observation and feedback to site personnel.

*** Managing Expectations is the ultimate indicant of successful EMS implementation. EMS by nature tends to evoke thoughts of automated decision making. Corporations and organizational users need to appreciate the emphasis on flexibility and support in EMS. Appropriately used, EMS provide efficient and effective support in an atmosphere of enhanced user satisfaction with technology. Expectations need to be communicated, monitored, and periodically revised recognizing the dynamic nature of EMS application.

CONCLUSION

Many opportunities, challenges, and responsibilities exist in effectively applying electronic meeting systems in military organization. The promise is certainly there. Electronic meeting systems are beginning to receive the same type of attention and reception that personal computing received approximately eight years ago. Initial corporate experiences have been extremely successful. New products are available daily. Tremendous opportunities exist to integrate these capabilities in military organizations. Much additional research, however, is needed to more fully evaluate the implications of these environments in military organizations recognizing the complex interrelated nature of EMS hardware, software, procedures, and facilitation.

Decision Rooms



Advanced Management Center

I. System Information

Name: Advanced Management Center

Organization: Metapraxis Inc.

Category: Decision Room, no facilitation, size of group varies with size of conference room

Cost: Contact Metapraxis for estimate

Contact Name: Paula Fuller
Business Development Manager
Metapraxis Inc.
900 Third Avenue, 36th Floor
New York, NY 10022

Telephone: (212) 935-4322
Fax: (212) 935-0721

II. Background

Objective

The goal of the Advanced Management Center is to improve the information available to directors and senior executives. The system is designed to run on a PC, be extensive enough to answer any inquiry, and be simple enough to be used without training.

History

Metapraxis is a consultancy firm which specializes in satisfying the information needs of senior executives in large corporations. The firm was established in 1979 in the United Kingdom, and its home base is in London. In 1988, Metapraxis opened an office in New York city. As of April 1989, the company has served over 70 multi-national clients based in the UK, Europe, and the United States. Clients include British Aerospace, British Telecom, Lloyds Bank, and the US General Accounting Office.

Metapraxis has developed a PC-based software package that is used to support managerial decision making. The software -- called Resolve -- is easy to use and can be installed to interface with any organizational information system. Resolve supports executives by helping them to more readily digest corporate information through the extensive use of computer graphics.

Originally developed as a single user system, Resolve has been integrated with another proprietary software package called Vision to support group decision making. The facility that utilizes Resolve and Vision to support group meetings is called the Advanced Management Center. The Advanced Management Center

(AMC) is conceptualized as a "war room," where the displays from Resolve can be projected onto giant screens on the wall. Other media devices such as videotapes, external databases, and slides can also be displayed onto wall screens. Metapraxis contends that the large screen displays of the AMC create a powerful new focus for discussing organizational issues.

In 1988, Metapraxis officials reported that Resolve was the most widely used PC-based executive information system in the world. While information is not available relating to the number of clients that are using AMC decision room configuration, it appears that a good number of Metapraxis' clients are using the AMC decision room application of the system. No figures are available regarding the revenue generated from the Metapraxis operations.

Future Outlook
Metapraxis has had strong sales success in the UK and Europe. With the opening of the US office in 1988, the company is making an aggressive move to increase sales and its worldwide market share. No information is available regarding product enhancements or new product development.

III. Characteristics

Tasks Supported
The AMC is designed to be a facility where managers can improve corporate control and decision making by getting rapid access to information and publicly displaying the information. The presentation components of the AMC allow a number of group activities to be supported such as strategic planning, review and control activities, and presentations.

The AMC is designed to support senior management. The size of the groups that can be supported depends on management's desires and the capacity of the conference room devoted to the AMC.

Facility
The AMC is a presentation room type of facility that allows a variety of media to be displayed and controlled. In addition to Resolve and other computer sources, the AMC can support the display of videotapes, external databases, slides, and transparencies. The facility does not support electronic modes of communication.

The AMC system is installed by Metapraxis at the client's site. Metapraxis consultants customize the software to match the needs of the client's management and to the local information systems. In addition, Metapraxis provides the designs and recommendations for the construction of the AMC group meeting facility. The AMC is generally installed in an existing conference room.

The presentation equipment required depends on the needs of the

client. Generally, an AMC facility will have equipment to support projection of computer images and graphics, 35 mm slides, transparencies, and videotapes.

Procedures and Facilitation
The AMC is designed to allow executives to operate without the need for a technician or facilitator.

Software and Hardware
The Resolve software has been developed to allow managers to easily tap into the corporate data base and monitor items such as sales and profit, manpower, market share, production volumes, GNP, and project achievement against plan. The firm has made strong efforts to make the system easy to use. To use Resolve, a manager can use a keypad similar to a touch-tone phone pad -- a keyboard does not need to be used. Typically, Resolve will organize corporate data along four dimensions: 1) financial or operational indicators, 2) subsidiaries, 3) actual, budget and forecasted values, and 4) time. Metapraxis contends that the ability to access data along these four dimensions is sufficient for all management needs.

Resolve is a modular management system. The core of the software is surrounded by eight modules that address different managerial needs. The various modules include database, graphics, and report applications. A client company can license only those modules that are needed by management.

The Vision software coordinates the various presentation devices used in the AMC. The purpose of Vision is to allow executives to utilize the AMC without the need for a technical operator. Vision is accessed through an infra red device similar to a remote television control.

The Resolve software is designed to operate on an IBM-AT compatible PC. The program requires 640 kb RAM and 1.5 Mb of storage. Typically, 10 Mb of hard disk storage are recommended.

IV. References

See technical literature provided by system developer.

Arizona Electronic Meeting System

I. System Information

Name: Arizona Electronic Meeting System

Organization: MIS Department, University of Arizona, Tucson

Category: Decision Room, chauffeured, supported and interactive meeting processes, 5-30 participants

Cost: Contact University of Arizona for an estimate

Contact: J.F. Nunamaker, Jr.
Department of Management Information Systems
College of Business and Public Administration
Tucson, Arizona, 85721

Telephone: (602) 621-2748

II. Background

Objective
The objective of the system is to improve the productivty of group work through the use of information technology.

History
The EMS project at the University of Arizona had its beginning in 1965 with development of PSL/PSA as part of the ISDOS Computer Assisted Software Engineering (CASE) project at Case Institute of Technology. PSL/PSA facilitated the structured recording and analysis of information system requirements to ensure consistency and completeness. While PSL/PSA was subsequently extended and refined to include code generators and system optimizers, the process still required users to enter system requirements in a highly structured formal language. In using PSL/PSA to support large system development projects, researchers found that users were unwilling to use such a formal language; the need to extend PSL/PSA to better support the definition of requirements was apparent.

In many of the organizations using PSL/PSA, the user group defining the requirements were represented by a large steering committee of 10-20 members. Thus by 1979, it had become clear that a special purpose room was required to adequately support these groups. Construction of the first EMS facility at Arizona began in 1984, with the facility opening in March 1985. By late 1986, usage of the room had demonstrated that it was effective in supporting a variety of organizational tasks, not just information systems planning.

Building on the experiences with the first facility, which demonstrated that 16 workstations was insufficient to support

many organizational groups, a second facility providing 24 workstations was opened in November, 1987. Since then, this technology has been transferred to six sites within IBM, where it has been used to support over 5000 meetings as of June, 1989.

Future Outlook
The Arizona EMS continues to evolve to meet the needs of its users, with many new tools having been recently developed and added to the EMS toolkit. Research is also expanding into supporting EMS videoconferencing among several geographically distributed meeting rooms, as well as moving the EMS software into a distributed environment so that meetings can occur in individual offices.

III. Characteristics

Tasks Supported
The Arizona EMS supports a broad spectrum of tasks, but typically has focused on those requiring larger groups (i.e. 7-30 people).

Facilities
Arizona currently operates two EMS facilities (plus a third facility dedicated to experimental research). Two more facilities are being designed and will be operational by 1991. All facilities provide participant work areas (i.e. tables or desks) arranged to provide a central focus at the front of the room. Each participant is provided with a separate networked, hard disk-based, color graphics micro-computer workstation that is recessed into the work area. Another one or two workstations serve as system consoles which are used by the group facilitator to control the EMS software. At least one large screen video display is provided at the front of the room, with other audio-visual support also available (typically white boards, flip charts and overhead projectors). This minimum system configuration provides the necessary process support for the face-to-face discussion of chauffeured and supported meeting processes, as well as the electronic communication of supported and interactive processes. External communications links are provided to a central mainframe for task support.

While information sharing is primarily supported by the group process tools discussed above, a software video switching system is provided that enables information from any workstation to be displayed on any other workstation(s). A software remote keyboard controller enables the facilitator to control the keyboard of any computer(s). Adjacent to the main meeting room is a control room that provides a wide array of electronic support, as well as a laser printer used to provide immediate hardcopy printouts of group sessions. A high-speed copier provides each group member with paper copies of all meeting information.

Procedures and Facilitation
All meetings begin with a pre-session meeting between the meeting faciliator and client group representatives to discuss the task, and set an initial agenda for the meeting. As there are a variety of group tools to support a variety of group activities from idea generation to voting/decision making, the objective of this pre-session meeting is to identify the set of tools that will best meet the objectives of the group.

During the meeting itself, the facilitator provides coordination by selecting, intiiating and terminating all the tools that will be used by the group. The group meeting process may include chauffeured, supported or interactive meeting processes, as well as traditional face-to-face discussion, depending upon the nature of the group and the task(s).

Software
The Arizona EMS tools fall into six distinct groups:

1) Session Management. Session Manager (SM) has three components: pre-session planning, in-session management, and post-session organization. SM supports pre-session planning by providing an electronic questionnaire to ensure that important information is not overlooked, and an agenda support tool to assist in planning agenda(s). SM provides in-meeting management by enabling the facilitator to have immediate access to the tool control menu, as well as providing a series of other functions, such as a task assignment tool. Post-session organization involves the logical organization and physical storage of the outputs of the session as part of the organizational memory.

2) Idea Generation. As the name implies, the objective of the idea generation tools is to support the group in generating ideas. Electronic Brainstorming (EBS) provides an interactive process, in which participants enter comments into many separate files that are randomly shared throughout the group. The high degree of process structure from randomly sharing many files attempts to address cognitive inertia by encouraging many separate electronic conversations or trains of thought to be developed -- the group cannot easily focus on one approach to the issue. Electronic Discussion System (EDS) works in a similar manner to EBS, except that all comments are placed in one central file, accessible by all participants at all times. Nominal Group Technique (NGT) is implemented using a tool called Idea Organizer (IO) (also described below), which when used to support NGT, provides a supported meeting process. Participants first develop a private list of ideas (possibly prior to the meeting), potentially addressing cognitive inertia and free riding. Ideas from the private lists are then shared with the group and discussed verbally and electronically.

3) Idea Organization. The purpose of idea organization is to identify, formulate and consolidate specific ideas, proposals or alternatives that have been discussed in idea generation tool,

and thus comments from this initial generation activity are available as task support. Idea Organizer (IO) provides an interactive process, while Issue Analyzer (IA) provides a more structured two-phase process to first identify (via an interactive process) and then consolidate (i.e. achieve consensus) on the list of ideas (via a chauffeured process).

4) Voting. There are a variety of prioritizing methods available in the vote tool (e.g. agree/disagree, multiple choice, 10-point scale ranking or ranking in order), all of which employ an interactive processes to collect votes. Alternative Evaluator (AE) is a multi-criteria decision making tool using an interactive process. With the Questionnaire tool each participant completes an electronic copy of the questionnaire form (which may change in response to the user's answers) using an interactive process.

5) Issue Exploration. Issue exploration differs from idea generation in that all issue exploration tools provide high task structure; comments are collected from participants using a task-specific framework. Topic Commenter (TC) which uses an interactive process, operates like a set of index cards, with each card having a name, and an area in which comments are entered. While TC does not impose process structure on the group, it does facilitates the provision of some process structure should the group so choose: division and coordination of effort is facilitated, as each card is labelled. The group can easily assign specific tasks to specific participants by having each work in selected windows. Stakeholder Identification and Assumption Surfacing (SIAS) which based on the strategic assumption surfacing and testing techniques developed by Mason and Mitroff is used to assess the potential impact of a plan or policy by identifying those individuals and organizations that affect (or are affected by) the plan (i.e. the "stakeholders"). SIAS provides highly structured supported process, by which participants first identify the stakeholders and then their assumptions, and before rating them for importance to the stakeholder and importance to the plan. The Policy Formation (PF) tool provides a highly structured multi-phase process for reaching agreement in the exact wording of a policy or mission statement, using a supported process.

6) Knowledge Accumulation and Representation. Thus far, many other EMS environments have typically supported the group meeting as an autonomous event, independent of other events. The Plexsys EMS, principally because of its roots in PSL/PSA/ISDOS, views the group meeting as one part of a larger process -- one step toward the final goal. While some tasks may be initiated, addressed and completed in one meeting, many projects span several meetings, and must be integrated with other tasks. The implications of this is that while improving the process of the group meeting is important, it also important to capture and store the additions to organizational memory arising from the meeting, and to provide access to this memory during meeting(s). File Reader (FR) is a

memory resident tool that provides any participant with immediate read-only access to any text file in the knowledge base at any point during the session. The user simply presses the appropriate keys and is presented with a menu describing every text file in the knowledge base. Enterprise Analyzer (EA) facilitates the structuring and analysis of group information in a semantic net using a variety of user-defined modeling techniques (such as PSL, IBM's Business System Planning (BSP), Data Flow Modeling, Porter's Value Chain, etc.). Information can be viewed in tabular form, or in graphical form with the Semantic Graphics Browser (SGB). SGB enables the user to move through the selected portion of the knowledge base (called the "world space"), and to "zoom-in" on specific areas to view details, "zoom-out" to obtain a high-level view of the entire world space, or "explode" a view to display detail information under a node.

IV. References

Dennis, A.R., George, J.F., Jessup, L.M., Nunamaker Jr., J.F. and Vogel, D.R. "Information Technology to Support Group Work", MIS Quarterly, 12:4,December, 1988, pp. 591-624.

Nunamaker Jr., J.F., Applegate, L.M., and Konsynski, B.R. "Facilitating Group Creativity with GDSS", Journal of Management Information Systems, 3:4, Spring 1987, pp. 5-19.

Vogel, D.R., Nunamaker Jr., J.F., George, J.F. and Dennis, A.R. "Group Decision Support Systems: Evolution and Status at the University of Arizona," in R.M. Lee, A.M. McCosh, and P. Migliarese (eds), Organizational Decision Support Systems, Proceedings of IFIP WG 8.3 Working Conference on Organizational DSS, North Holland, 1988, pp.287-305.

Nunamaker Jr., J.F. Applegate, L.M. and Konsynski, B.R., "Computer-Aided Deliberation: Model Management and Group Decision Support," Journal of Operations Research, November-December, 1988, pp. 826-848.

Nunamaker Jr., J.F. Vogel, D., Heminger, A., Martz, B., Grohowski, R. and McGoff, C. "Experiences at IBM with Group Support Systems: A Field Study," Decision Support Systems, forthcoming, 1989.

Automated Decision Conferencing

I. System Information

Name: Automated Decision Conferencing

Organization: Decision Technologies Group (DTG), SUNY Albany

Category: Decision Room, chauffeured meeting process, 7-15 participants

Cost: $10,000 for one two-day decision conference

Contact Name: Dr. John Rohrbaugh
Department of Public Administration
State University of New York at Albany
Albany, NY 12222

Telephone: (518) 442-3850

II. Background

Objective
The objective of the facility is to improve the productivity of group decision making, without the restrictions imposed by computer communication.

History
DTG is a consulting arm of the SUNY Public Administration group that was formed to help public agencies reach consensus on complex decisions. While DTG's focus is on local (i.e. New York State) agencies, the service is available to any public or private sector organization. Since 1985, DTG has conducted over 65 decision conferences.

Future Outlook
DTG anticipates few changes, although the group continually is on the lookout for new commercial modeling software that might be appropriate for incorporation into their system. They expect to continue to average 12 decision conferences per year.

III. Characteristics

Tasks Supported
DTG assists the client group in arriving at a single decision to a specific problem by using a formal modeling technique, such as simulation or multi-attribute decision making.

Facility
Decision conferences are typically held in a conference room at the client site. DTG and/or the client provides a white board, overhead projector with a Kodak Datashow, and one IBM or

MacIntosh PC.

Procedures and Facilitation

A decision conference begins with a pre-session meeting between DTG and client group representatives to determine that the client group is ready to make a decision and that the problem is appropriate for the modeling software used by DTG. The first day of the two-day decision conference begins with a general discussion of the issues involved with the decision. Guided by the DTG facilitator, the group thinks creatively about the problem and attempts to ensure that all relevant issues and facts are elicited and recorded by the facilitator on the white board. During this process, all comments are recorded by a stenographer for later review, and a DTG analyst begins to build a model using the selected software package. The second day of the conference begins with the group examining the computer model for the first time. This model is discussed and refined until the group is satisfied, at which point the decision is made, and discussion switches to developing a plan of action.

Software

Decision conferences use one of four commercially available packages:

1) EquiT (by ICL) is a resource allocation model,
2) HIVIEW (ICL) is a multi-attribute decision making model,
3) Stella is a graphically-based simulation package,
4) Policy PC is used to make subjective judgements explicit and to resolve conflicting opinions among the decision making group.

IV. References

Quinn, R., Rohrbaugh, J. and McGrath, M. "Automated Decision Conferencing: How it Works," Personnel, November, 1985, pp. 49-55.

McCartney, L. "Brainstorming Problems with the Computer," Dun's Business Month, January, 1987.

McCartt, A.T. and Rohrbaugh, J. "Evaluating Group Decision Support System Effectiveness: A Performance Study of Decision Conferencing," Decision Support Systems, 1989, forthcoming.

Capture Lab

I. System Information

Name: Capture Lab

Organization: Center for Machine Intelligence (CMI), affiliated with the University of Michigan

Category: Decision Room, chauffeured meeting process, 4-8 participants

Cost: Not a commercial product

Contact Name: Paul Scott
Center for Machine Intelligence
2001 Commonwealth Blvd
Ann Arbor MI 48105

Telephone: (313) 995-0900

II. Background

Objective
The goal of the system is to use shared hardware to support organizational meetings, ensuring that the computer does not interfere with traditional meeting processes.

History
Much of this project to date has focused on specific room design issues such as size and shape of the conference table, placement of the chairs and participant workstations around the table, and placement of the video projection system.

Future Outlook
Future work is expected to focus on the development of custom software to support group work, such as brainstorming.

III. Characteristics

Tasks Supported
The tasks that are supported include document creation and recording meeting minutes.

Facility
The facility consists of a Decision Room with 8 MacIntosh computers inset horizontally into the an oval conference table (i.e. almost flush with the table top) so that all participants can easily conduct face-to-face conversations (and view each other's screens). An additional MacIntosh connected to a large screen video projection system is available as a central group resource.

Procedures and Facilitation
The focus is on verbal interaction and face-to-face discussion. Computer facilities are intended to support a traditional meeting process, "not interfere with it"; thus use of the computer is not the significant activity of the meeting. Meetings typically involve participants sharing the control of the central computer connected to the video projector and using it to document key discussion issues and meeting minutes once agreement is reached.

Software
Commercially available software packages form the backbone of the meeting support tools, primarily word processing and graphics packages, thus reducing training time as participants can use their favorite packages. However, problems have been noted due to the unfamiliarity of participants with MacIntoshes in general. Custom software is provided that enables users to take control of the central workstation connected to the video projection system so that users can present information for group discussion. The MacIntosh clipboard feature is also used to transfer information from user workstations to the central workstation.

IV. References

Mantei, M. "Capturing the Capture Lab Concepts: A Case Study in the Design of Computer Supported Meeting Environments," Proceedings of the 1988 Conference on Computer Supported Cooperative Work, 1988, pp. 257-270.

Mantei, M. "A Study of Executives Using a Computer Supported Meeting Environment," Decision Support Systems, 1989, forthcoming.

COLAB

I. System Information

Name: COLAB

Organization: Xerox PARC

Category: Decision Room, supported meeting process, 3-6 participants

Cost: Not a commercial product

Contact Name: Gregg Foster
Xerox PARC
3333 Coyote Hill Road
Palo Alto CA 94340

II. Background

Objective
The objective of COLAB is to understand how computers can make groups more effective.

History
The original focus of the Colab project was to make face-to-face meetings more productive by developing a computer system to replace the traditional white board. The result was the development of a flexible, graphically oriented system for writing and manipulating large amounts of information as a group.

Future Outlook
The focus of the Colab project is beginning to shift from supporting face-to-face discussion to supporting distributed meetings held in individuals' offices.

III. Characteristics

Tasks Supported
The tasks supported include collaborative writing and idea generation,

Facility
The facility consists of a traditional Decision Room with a Xerox workstation for each participant, and a large screen video display. However, the emphasis is on graphical mouse-driven interfaces, with shared workspaces. That is, the common group workspace is constantly maintained at each user's workstation so that all participants have a common view of the group's information.

Procedures and Facilitation
The meeting process provided by the Colab tools often involves meeting participants discussing the task at hand, and then sub-dividing the tasks into components which are then tackled by participants individually. During the meeting there is much verbal discussion as the group generates ideas and discusses them to arrive at a consensus.

Software
While many prototype tools have been developed, three primary tools have emerged: 1) Cognoter, an idea generation and brainstorming tool; 2) Cnoter, an idea organizing tool with a simplified and improved interface and process model; 3) Sketchtool, an electronic version of the white board

IV. References

Foster, G. and Stefik, M. "Cognoter: Theory and Practice of a Colab-orative Tool," Proceedings of the Conference on Computer Supported Cooperative Work, 1986, pp. 7-15.

Stefik, et al. "Beyond the Chalkboard: Computer Support for Collaboration and Problem Solving in Meetings," Communications of the ACM, 30:1, 1987, pp. 32-47.

Electronic Meeting Coordinator

I. System Information

Name: Electronic Meeting Coordinator

Organization: Group Technologies Corporation

Category: Decision Room, chauffeured and supported meeting processes, 3-7 participants

Cost: Contact Group Technologies for an estimate

Contact Name: Gerald R. Wagner
Group Technologies Corporation
6504 Bridgepoint Parkway, Suite 302
Austin, TX 78730

Telephone: (512) 345-7885

II. Background

Objective
The objective of the system is to provide computer augmentation of face-to-face meetings at the executive planning and decision making level, with the ability to conduct meeting audits.

History
Gerry Wagner was one of the early innovators in the GDSS area, having developed an original Decision Room at Execucom. With the expiration of his non-competition agreement after selling Execucom, Dr. Wagner has recently reentered the GDSS arena with the establishment of a new start-up company. While no product has yet been released, he intends to be the first company with a serious commercial product.

III. Characteristics

Tasks Supported
The system supports all types of meetings ranging from information presentation to decision making.

Facility
The facility consists of a traditional Decision Room with a 32-bit computer workstation for each participant, and a large screen video display

Procedures and Facilitation
Detailed information is not available.

Software
Software support for three stages of the meeting has been

proposed:
1) Pre-meeting planning software assists in the preparation and distribution of the agenda to participants prior to the meeting, as well as the selection of possible participants. The software may also assist in the structured collection of thoughts and ideas of the participants on the meeting topic prior to the meeting. Additionally, this software may useful in assisting those who will be presenting information by helping them to prepare graphical support and rehearse their material.
2) Software support during the meeting provides a number of distinct functions. First, the system ensures the meeting remains on the scheduled agenda by using a graphical time clock to ensure that presenters are constantly aware of how much time they have left. This component also records the cost (using the salaries of those present) of the time spent on each phase of the meeting for later audit. Second, mood indicators (e.g. "I'm bored") and talk queues (i.e. who gets to speak next) people are maintained. Third, some ability to input ideas at each workstation and send those to other participants will be provided.
3) Post-session software provides a meeting chapter that documents the meeting session, including participant list, graphics used, decision(s) made, action items agreed to, the amount of time (and cost) used by each phase of the meeting (including pre- and post-session activities), and an evaluation by the participants of the effectiveness of each part of the meeting. This information is used to support subsequent meetings, plus provides the documentation required for periodic audits.

IV. References

For an overview of Dr. Wagner's early work at Execucom see:
Gibson, D.V. and Ludl, E.J.. "Group Decision Support Systems and Organizational Context," in R.M. Lee, A.M. McCosh and P. Migliarese (ed), Organizational Decision Support Systems, North-Holland, 1988, pp. 273-285.

For a discussion of the concepts behind his current work, see:
Wagner, G.R. and Nagasundaram, M. "Meeting Process Augmentation: The Real Substance of GDSS," in R.M. Lee, A.M. McCosh and P. Migliarese (ed), Organizational Decision Support Systems, North-Holland, 1988, pp. 305-316.

NEGO (GDS1)

I. System Information

Name: NEGO and/or GDS1

Organization: School of Business, Carleton University

Category: Decision Room (negotiation support system), chauffeured process

Cost: Not available

Contact Name: Gregory E. Kersten
School of Business
Carleton University
Ottawa, Ontario
Canada K1S 5B6

II. Background

Objective
The objective of the system is to provide formal modeling to support negotiation.

III. Characteristics

Tasks Supported
The system supports proposal formulation and evaluation for inter-group negotiation.

Facility
The facility includes two IBM micro-computers or an IBM 370 mainframe running VM/VSP.

Procedures and Facilitation
A negotiator from each of the two groups simultaneously enter acceptable values for specific settlement items. The system then calculates an optimum proposal for each group. After reviewing the optimum proposal and making any desired changes, each group then submits the proposal to the other group. This process continues iteratively until a settlement is reached.

Software
Detailed information not available.

IV. References

Kersten, G.E. "NEGO - Group Decision Support System," Information and Management, 1985, 8, pp. 237-246.

Kersten, G.E. and Szapiro, T. "Generalized Approach to Modeling Negotiations,"European Journal of Operations Research, 1986, 26, pp. 124-142.

Project Nick

I. System Information

Name: Project Nick (This project was cancelled in 1988, although other EMS work at MCC continues)

Organization: Microelectronics and Computer Technology Group (MCC)

Category: Decision Room, chauffeured and supported meeting processes, 4-7 participants

Cost: Not a commercial product.

Contact Name: Skip Ellis
Microelectronics and Computer Technology Group
3500 West Balcones Center Drive
Austin TX 78759-6509

Telephone: (512) 338-3384

IV. References

Cook, et al "Project Nick: Meetings Augmentation and Analysis," *ACM Transactions on Office Information Systems*, 5:2, April 1987, pp. 132-146.

Jarvenpaa, et al. "Computer Support for Meetings of Groups Working on Unstructured Problems: A Field Experiment," MIS Quarterly, 12:4, December, 1988.

Option Technologies

I. System Information

Name: Option Technologies

Organization: Option Technologies, Inc.

Category: Portable Decision Room, chauffeured and interactive meeting processes, 8-50 participants

Cost: $10,000

Contact Name: William Flexner
Option Technologies, Inc.
1275 Knollwood Lane
Mendota Heights, MN 55118

Telephone: (612) 450-1700

II. Background

Objective
The goal of the system is to increase the productivity of meetings by thinking through the structure and process, and to gain a new depth of understanding of critical issues as participants interpret their voting.

History
Mr. Flexner has been a meeting facilitator since 1977. Option Technologies was established in 1985, and made its first sale in 1986. To date, 115 systems have been sold (to customers on every continent except Antarctica), primarily to independent consultants and internal consulting divisions of major corporations. IBM has purchased 60 systems, and is using them to facilitate customer strategic planning.

Future Outlook
Sales are forecasted to continue at 3-5 systems per month. A Kanji version for the Asian market has just recently been developed. An agenda development tool and some form of graphical sketch pad are presently being considered. One of the other co-founders of Option Technologies, Mr. Kim Wheatley, has expressed concern that technology is outpacing the abilities of groups to use it. He is concerned that the simple voting keypads (see below) are too intrusive to the group process and that the entry of votes is too difficult for participants. They are looking for ways to eliminate the need for group members to interact with computers (i.e. moving to an entirely chauffeured meeting process).

III. Characteristics

Tasks Supported
Many types of decision making meetings are supported, but substantial software support is only available for voting.

Facility
Option Technologies has developed a portable system that may be moved from group to group, room to room, as Mr. Flexner feels that when a group uses a permanent Decision Room, the group does not adopt the decision process used in the room when it leaves. He believes that the use of a portable system will encourage groups to adopt more structured processes when not using the technology. The software requires one IBM PC with CGA graphics. The $10,000 fee includes a wide screen video projector and eight keypads developed by Option Technologies (one for each meeting participant).

Procedures and Facilitation
The group verbally discusses the major issues and instructs the facilitator to enter them into the system. Once the list of issues has been settled, the group votes using the special purpose keypads. The votes are collected and then discussed under the direction of the facilitator.

Software
Software provided for the facilitator permits the entry of ideas and alternatives discussed by the participants (maximum three lines of text each). The keypads available to the participants provide four types of voting (paired comparison, Likert scale, rating, categorical scale). The software is written in QuickBasic.

IV. References

See technical literature provided by system developer.

The Pod

I. System Information

Name: The Pod

Organization: International Computers Limited (ICL)

Category: Decision Room, chauffeured meeting process, up to 12 participants

Cost: Contact ICL for estimate

Contact Name: Robin Seward
Training Consultant
International Computers Limited (ICL)
Wokefield Park
Mortimer
Berkshire RG7 3AG
United Kingdom

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Fax: 0734 332099
Telex: 848831

II. Background

Objective
The Pod is a meeting room environment designed to enable groups of managers to be more effective. Built specifically to address the needs of higher level managers, the ICL's designers have sought to create an ergonomic decision room environment that is conducive to executive users.

History
The Pod is a commercial product that was developed by ICL, Britain's largest computer company. Acquired in 1984 by STC, a British electronics concern, ICL sells a wide variety of computer products and services including hardware, software, and consultant services. After experiencing a series of financial setbacks in the early 1980s, ICL's operations were turned around by a major reorganization initiated by a new management team. In 1986, ICL had sales of over one billion pounds.

The Pod is a decision room facility that was conceived and designed by ICL's Management Support Business Center. Development on the Pod began in late 1984 to meet the needs of management processes which take place in face-to-face groups. Based on its extensive experience with the Pod and feedback from users, ICL report that the facility has proven to enhance small group processes among high level executives.

Based on ICL literature, the Pod is currently being marketed to

external customers. No figures are available regarding the revenue generated from the Pod operations.

Future Outlook
As of Summer 1989, ICL was still marketing the Pod facility. No information is available regarding future development or marketing plans for the Pod.

III. Characteristics

Tasks Supported
The Pod is designed to be flexible and support basic group activities, rather than specific tasks. The presentation components of the Pod allow a number of group activities to be supported. The Pod has been used to support planning activities, reviewing activities, development workshops, training activities, presentations with corporate clients, and negotiations with third parties.

Facility
The Pod is a presentation room type of facility that provides a variety of support for computer, graphical, audio and visual presentations. The facility does not support electronic modes of communication. The Pod is designed to support groups from upper management and can support up to twelve people.

The Pod is an octagonal meeting room with dimensions of roughly 21 feet by 21 feet. In the center of the room is a round conference table surrounded by up to twelve chairs. The setting of the Pod facility is furnished and decorated to appeal to executive users. The walls of the Pod are used to display a variety of information needed for decision making including: a mounted flip chart, two magnetic dry wipe surfaces, a white projector screen for 35 mm slides, an electronic white board which allows for copying board images, and a video projector screen. The Pod also has a recessed alcove that serves as a technician's work station and a small "walk out area" behind one of the walls that contains telephones, a coffee maker, and a refrigerator.

Despite the large variety of presentation aids available in the facility, the Pod has been designed to such that the technology is as unobtrusive as possible. Thus, according to ICL, the Pod provides valuable audio-visual media support during a meeting without overwhelming the participants or requiring special skills.

Procedures and Facilitation
ICL recommends that group sessions utilizing the Pod be scheduled at ICL's Pod locations. Alternatively, a Pod facility can be installed temporarily at or near the client's site. A typical decision conference session for an external group will include a two-day decision conference involving up to twelve participants.

For each external group, ICL provides a facilitator and an analyst who are experienced in working with decision groups.

Every decision conference is tailored to the client's needs. Prior to the session, the ICL facilitator meets the sponsor to a) establish the suitability of the Pod for the issues of concern, b) identify the key people who can contribute to the meeting, and c) establish objectives for the two day session.

During the Pod session, a facilitator and technician are on hand to assist with the meeting. The facilitator's role is to guide the group through the decision process, while the technician supplies technical support. Typically, the facilitator will take an active role in helping a decision group make the best use of the Pod facilities.

Although the technician is on hand to help, ICL reports that participants are able to control much of the media features themselves by means of a hand-held infra red controller similar to a television remote control. The controller is linked to microprocessor software that allows automation of specific user functions. For example, if a participant selects a given presentation medium, the controller will automatically project the required screen, adjust the room lighting to the optimal level, and switch off any sound source, allowing participants attention to be drawn to the visual information selected.

Software and Hardware

ICL has created special software tools to be used with the Pod. One type of software is described as a unique "computer-based model which incorporates the different perspectives of the participants." Other software includes a special business graphics package that provides a variety of color graphics charts. Also, network communication software is available to link the Pod with client information systems or other external databases.

IV. References

Seward, Robin. "The Support of Managerial Groups: A New Development," Unpublished Masters of Philosophy Thesis, Department of Systems, University of Lancaster, 1987.

Also see technical literature provided by system developer.

SAMM

I. System Information

Name: SAMM (Software Assisted Meeting Management)

Organization: IS Department, University of Minnesota

Category: Decision Room, supported meeting process, 3-8 participants

Cost: Not a commercial product

Contact Name: Gary Dickson
Department of Information and Decision Sciences
Carlson School of Management
University of Minnesota
Minneapolis, MN 55455

II. Background

Objective
The objective of SAMM is to provide a computer supported meeting environment to support a program of behavioral research.

History
Development of the SAMM system began several years ago as a simple system to support a behavioral research program into the effects of computer technology on group work. Since then it has been significantly upgraded and is currently undergoing field trials at the IRS.

III. Characteristics

Tasks Supported
The system is primarily used to support small group decision making.

Facility
The facility consists of a traditional Decision Room with a large screen monitor, and a workstation for each participant connected to an NCR Tower mini-computer running Unix.

Procedures and Facilitation
Meetings typically rapidly alternate between periods of face-to-face discussion and individual typing at keyboards. The keyboards are generally used to generate alternatives, etc. which are then projected on the large monitor for verbal discussion.

Software
A variety of custom software tools are provided to each user via a series of menus. SAMM provides functions such as defining,

recording, and displaying problem issues, solution criteria, as well as alternative evaluation and voting.

IV. References

DeSanctis, G. and Dickson, G.W. "GDSS Software: A Shell System in Support of a Program of Research," Proceedings of HICSS, 1987.

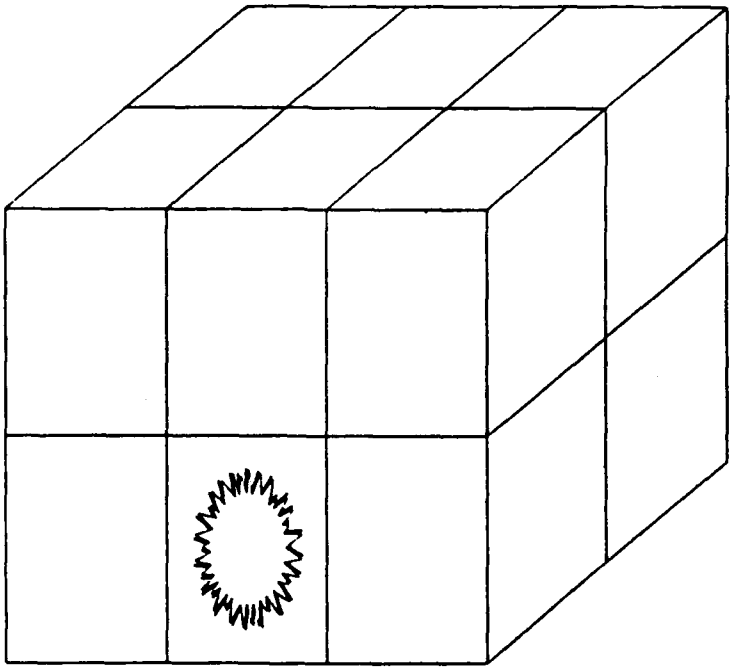
DeSanctis, G., Sambamurthy, V., and Watson, R.G. "Computer Supported Meetings: Building a Research Environment," DSS-88, pp. 3-12. Also published in Large Scale Systems, 13:1, 1988, pp. 43-59.

Gallupe, R.B., DeSanctis, G. and Dickson, G.W. "Computer-Based Support for Group Problem Finding: An Experimental Investigation," MIS Quarterly, 12:2, June, 1988, pp. 277-296.

Watson, R.T., DeSanctis, G. and Poole, M.S. "Using a GDSS to Facilitate Group Consensus: Some Intended and Unintended Consequences," MIS Quarterly, 12:3, September, 1988, pp. 463-478.

Zigurs,I., Poole, M.S. and DeSanctis, G. "A Study of Influence in Computer-Mediated Communication," MIS Quarterly, 12:4, December, 1988, pp. 625-644.

Legislative Session



Arizona Electronic Meeting System

I. System Information

Name: Arizona Electronic Meeting System

Organization: MIS Department, University of Arizona, Tucson

Category: Decision Room, chauffeured, supported and interactive meeting processes, 5-30 participants

Cost: Contact University of Arizona for an estimate

Contact: J.F. Nunamaker, Jr.
Department of Management Information Systems
College of Business and Public Administration
Tucson, Arizona, 85721

Telephone: (602) 621-2748

II. Background

Objective
The objective of the system is to improve the productivty of group work through the use of information technology.

History
The EMS project at the University of Arizona had its beginning in 1965 with development of PSL/PSA as part of the ISDOS Computer Assisted Software Engineering (CASE) project at Case Institute of Technology. PSL/PSA facilitated the structured recording and analysis of information system requirements to ensure consistency and completeness. While PSL/PSA was subsequently extended and refined to include code generators and system optimizers, the process still required users to enter system requirements in a highly structured formal language. In using PSL/PSA to support large system development projects, researchers found that users were unwilling to use such a formal language; the need to extend PSL/PSA to better support the definition of requirements was apparent.

In many of the organizations using PSL/PSA, the user group defining the requirements were represented by a large steering committee of 10-20 members. Thus by 1979, it had become clear that a special purpose room was required to adequately support these groups. Construction of the first EMS facility at Arizona began in 1984, with the facility opening in March 1985. By late 1986, usage of the room had demonstrated that it was effective in supporting a variety of organizational tasks, not just information systems planning.

Building on the experiences with the first facility, which demonstrated that 16 workstations was insufficient to support

many organizational groups, a second facility providing 24 workstations was opened in November, 1987. Since then, this technology has been transferred to six sites within IBM, where it has been used to support over 5000 meetings as of June, 1989.

Future Outlook
The Arizona EMS continues to evolve to meet the needs of its users, with many new tools having been recently developed and added to the EMS toolkit. Research is also expanding into supporting EMS videoconferencing among several geographically distributed meeting rooms, as well as moving the EMS software into a distributed environment so that meetings can occur in individual offices.

III. Characteristics

Tasks Supported
The Arizona EMS supports a broad spectrum of tasks, but typically has focused on those requiring larger groups (i.e. 7-30 people).

Facilities
Arizona currently operates two EMS facilities (plus a third facility dedicated to experimental research). Two more facilities are being designed and will be operational by 1991. All facilities provide participant work areas (i.e. tables or desks) arranged to provide a central focus at the front of the room. Each participant is provided with a separate networked, hard disk-based, color graphics micro-computer workstation that is recessed into the work area. Another one or two workstations serve as system consoles which are used by the group facilitator to control the EMS software. At least one large screen video display is provided at the front of the room, with other audio-visual support also available (typically white boards, flip charts and overhead projectors). This minimum system configuration provides the necessary process support for the face-to-face discussion of chauffeured and supported meeting processes, as well as the electronic communication of supported and interactive processes. External communications links are provided to a central mainframe for task support.

While information sharing is primarily supported by the group process tools discussed above, a software video switching system is provided that enables information from any workstation to be displayed on any other workstation(s). A software remote keyboard controller enables the facilitator to control the keyboard of any computer(s). Adjacent to the main meeting room is a control room that provides a wide array of electronic support, as well as a laser printer used to provide immediate hardcopy printouts of group sessions. A high-speed copier provides each group member with paper copies of all meeting information.

Procedures and Facilitation

All meetings begin with a pre-session meeting between the meeting faciliator and client group representatives to discuss the task, and set an initial agenda for the meeting. As there are a variety of group tools to support a variety of group activities from idea generation to voting/decision making, the objective of this pre-session meeting is to identify the set of tools that will best meet the objectives of the group.

During the meeting itself, the facilitator provides coordination by selecting, intiiating and terminating all the tools that will be used by the group. The group meeting process may include chauffeured, supported or interactive meeting processes, as well as traditional face-to-face discussion, depending upon the nature of the group and the task(s).

Software

The Arizona EMS tools fall into six distinct groups:

1) Session Management. Session Manager (SM) has three components: pre-session planning, in-session management, and post-session organization. SM supports pre-session planning by providing an electronic questionnaire to ensure that important information is not overlooked, and an agenda support tool to assist in planning agenda(s). SM provides in-meeting management by enabling the facilitator to have immediate access to the tool control menu, as well as providing a series of other functions, such as a task assignment tool. Post-session organization involves the logical organization and physical storage of the outputs of the session as part of the organizational memory.

2) Idea Generation. As the name implies, the objective of the idea generation tools is to support the group in generating ideas. Electronic Brainstorming (EBS) provides an interactive process, in which participants enter comments into many separate files that are randomly shared throughout the group. The high degree of process structure from randomly sharing many files attempts to address cognitive inertia by encouraging many separate electronic conversations or trains of thought to be developed -- the group cannot easily focus on one approach to the issue. Electronic Discussion System (EDS) works in a similar manner to EBS, except that all comments are placed in one central file, accessible by all participants at all times. Nominal Group Technique (NGT) is implemented using a tool called Idea Organizer (IO) (also described below), which when used to support NGT, provides a supported meeting process. Participants first develop a private list of ideas (possibly prior to the meeting), potentially addressing cognitive inertia and free riding. Ideas from the private lists are then shared with the group and discussed verbally and electronically.

3) Idea Organization. The purpose of idea organization is to identify, formulate and consolidate specific ideas, proposals or alternatives that have been discussed in idea generation tool,

memory resident tool that provides any participant with immediate read-only access to any text file in the knowledge base at any point during the session. The user simply presses the appropriate keys and is presented with a menu describing every text file in the knowledge base. Enterprise Analyzer (EA) facilitates the structuring and analysis of group information in a semantic net using a variety of user-defined modeling techniques (such as PSL, IBM's Business System Planning (BSP), Data Flow Modeling, Porter's Value Chain, etc.). Information can be viewed in tabular form, or in graphical form with the Semantic Graphics Browser (SGB). SGB enables the user to move through the selected portion of the knowledge base (called the "world space"), and to "zoom-in" on specific areas to view details, "zoom-out" to obtain a high-level view of the entire world space, or "explode" a view to display detail information under a node.

IV. References

Dennis, A.R., George, J.F., Jessup, L.M., Nunamaker Jr., J.F. and Vogel, D.R. "Information Technology to Support Group Work", MIS Quarterly, 12:4,December, 1988, pp. 591-624.

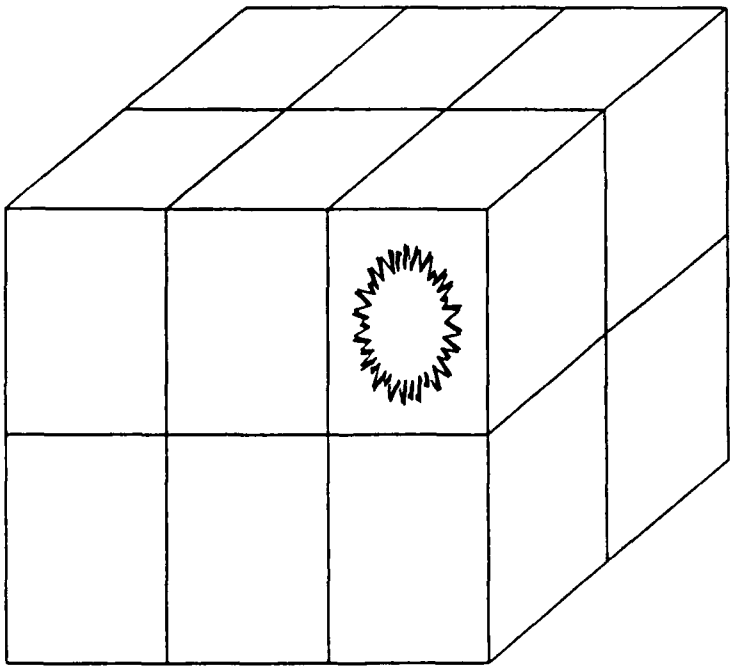
Nunamaker Jr., J.F., Applegate, L.M., and Konsynski, B.R. "Facilitating Group Creativity with GDSS", Journal of Management Information Systems, 3:4, Spring 1987, pp. 5-19.

Vogel, D.R., Nunamaker Jr., J.F., George, J.F. and Dennis, A.R. "Group Decision Support Systems: Evolution and Status at the University of Arizona," in R.M. Lee, A.M. McCosh, and P. Migliarese (eds), Organizational Decision Support Systems, Proceedings of IFIP WG 8.3 Working Conference on Organizational DSS, North Holland, 1988, pp.287-305.

Nunamaker Jr., J.F. Applegate, L.M. and Konsynski, B.R., "Computer-Aided Deliberation: Model Management and Group Decision Support," Journal of Operations Research, November-December, 1988, pp. 826-848.

Nunamaker Jr., J.F. Vogel, D., Heminger, A., Martz, B., Grohowski, R. and McGoff, C. "Experiences at IBM with Group Support Systems: A Field Study," Decision Support Systems, forthcoming, 1989.

EMS
Teleconference



Commune

I. System Information

Name: Commune

Organization: Xerox PARC

Category: EMS Teleconference (audio, video , electronic drawing)

Cost: Not a commercial product

Contact Name: Sara Bly
Xerox PARC
3333 Coyote Hill Road
Palo, Alto, CA 94304

Phone: (415) 494-4360
Email: bly.pa@xerox.com

II. Background

Objective
The objective of Commune is to support shared drawing in remote settings.

History
For several years, Xerox PARC has been involved with research relating to technology used to support collaborative work. This work has led to the creation of electronic environments, called Media Spaces, to enhance communications among designers. Commune is a project that emerged from this stream of research. The researchers observed that there was a need for an electronic tool to allow two or more remote users to write on the same surface at the same time while still maintaining face-to-face contact. The Commune system was developed to address this need. The system involves audio, video, and digital drawing technology.

Commune has been developed and tested for two remote user stations. The system was found to provide a great increase in the feeling of effective communication and interaction over a more basic form of a video conferencing system.

III. Characteristics

Tasks Supported
Commune allows collaborative workers at two separate remote locations to share drawing activities. Although the system was motivated by a need to support drawing for the design task, the tool can support any type of task in which drawing is a meaningful mode of communication.

Facility
Commune is a part of the Xerox PARC Media Spaces collaborative work en

Software and Hardware
Commune utilizes the communications software technology associated with the Media Spaces environment. Hardware equipment includes a telephone for audio communication and a video camera for a view of the remote participant. In addition, each Commune station has an electronic drawing apparatus which consists of a transparent digitizing tablet with a stylus mounted over a flat-screen display monitor. A PC processor is used to link the two existing Commune workstations. The monitors are daisy chained together so that cursor moverments and drawings are displayed at both stations simultaneously.

IV. References

Bly, S. "A Use of Drawing Surfaces in Different Collaborative Settings," Proceedings of the Conference on CSCW, September 1988, Portland, OR., pp. 250-256.

Media Spaces

I. System Information

Name: Media Spaces

Organization: Xerox PARC

Category: EMS Teleconference (audio, video)

Cost: Not a commercial product

Contact Name: Steve Harrison
Researcher
Design and Media Spaces Area
Xerox PARC
3333 Coyote Hill Road
Palo, Alto, CA 94304

Phone: (415) 494-4360
Email: Harrison.pa@xerox.com

II. Background

Objective

The objective of the Media Spaces research is to develop a collection of environments to enhance real-time communications among designers through extensive use of video technology.

History

For several years, Xerox PARC has been involved with research relating to technology used to support collaborative design work. This work has led to the creation of electronic environments, called Media Spaces, to enhance communications among designers. The Media Spaces projects involve much use of video technology to support the design process. The developers believe that by focussing on design as a communication activity, instead of simply information processing, has had profound effects on how to view design processes and the means for improving these processes.

Media Spaces projects have been tested and evaluated for a number of practical applications. For example, Media Spaces was used for two years to support collaborative work between Xerox laboratories in Palo Alto, California and Portland, Oregon. The system has also been used to support a number of design applications. The workplace at Xerox PARC has utilized the Media Spaces environment for four years, with positive results.

III. Characteristics

Tasks Supported

The Media Spaces projects were orginally motivated by a need to support design tasks. However, the tool can support a variety of

meeting tasks for dispersed groups.

Facility
A typical Media Space installation consists of a number of distributed individual offices equipped with a video camera, two video monitors (one to view outgoing video and one to view the video from a remote location), an audio system, a personal computer to control the environment, and connections to a distribution network.

Software and Hardware
Computers are used in a Media Space primarily to control the audio and video resources. Their role is to reduce the apparent complexity of the system. Computers are also used to organize assorted data.

IV. References

Goodman, G. and Abel, M. "Collaboration Research in SCL," Proceedings of the Conference on CSCW, 1986, Austin, TX, pp. 246-251.

Multimedia Conferencing Project

I. System Information

Name: Multimedia Conferencing Project

Organizations: Information Sciences Institute (affiliated with University of Southern California), BBN Systems and Technology Corporation

Category: EMS Teleconference (audio, video, shared computer workspace)

Cost: Not a commercial product

Contact Name: Eve M. Schooler or Stephen L. Casner
Information Sciences Institute
University of Southern California
4676 Admiralty Way
Marina del Rey, CA 90292

II. Background

Objective
The objective of the Multimedia Conferencing project has been to develop and test a system for realtime, multisite conferencing using audio, video, and shared workspace technology. The focus has been on creating a virtual meeting environment to supplement face-to-face meetings.

History
The Multimedia Conferencing project is a collaborative effort between the Information Sciences Institute (ISI) and BBN Systems and Technology Corporation. The project has resulted in the development of a prototype conferencing system that allows for collaboration between geographically dispersed sites. To date, the prototype system has been used for many all day tele-meetings. While most meetings have been between two sites, it is possible to include up to four sites in a conference.

The researchers have approached the project from a communications and architectural perspective. Based on the researchers' experience with the facility, they have developed a body of practical knowledge relating to the design and utilization of such a system. Future efforts with the project will address protocol design for realtime voice and video, and control protocols for distributed, synchronous software. Other topics of interest are the scalability of the system and the development of a unified interface to the teleconferencing environment.

III. Characteristics

Tasks Supported
The Multimedia Conferencing system allows users at multiple sites

to convey information through means of audio, video, and computer media. The audio media channel allows group participants to converse with one another by voice. The video channel offers two options: a) participants can view conference members from other sites on a video screen or b) they can view a video image of graphic slides or stills. The computer media allows meeting participants to share a computer-based workspace. This is made possible by a conferencing umbrella program, which allows an otherwise single-user program to be used simultaneously by several users at multiple sites.

Facility

Each site using the Multimedia Conferencing system requires a variety of equipment to support the audio, video, and computer media. Microphones and headphones are used to communicate by voice. Two cameras and a monitor are used to provide the video medium. With regard to the computer media, only one workstation is currently used at each site. Hence, only one individual at a time (for each site) can communicate using this channel.

Procedures and Facilitation

Researchers with the Multimedia Conferencing project have observed that a certain informal user etiquette is required to make best use of the system. Due to the long distances involved with using the groupware, there are delays associated with voice, video, and computer signals. Hence, users need to be make sure group participants from remote locations are done with their input before adding new contributions to the group discussion.

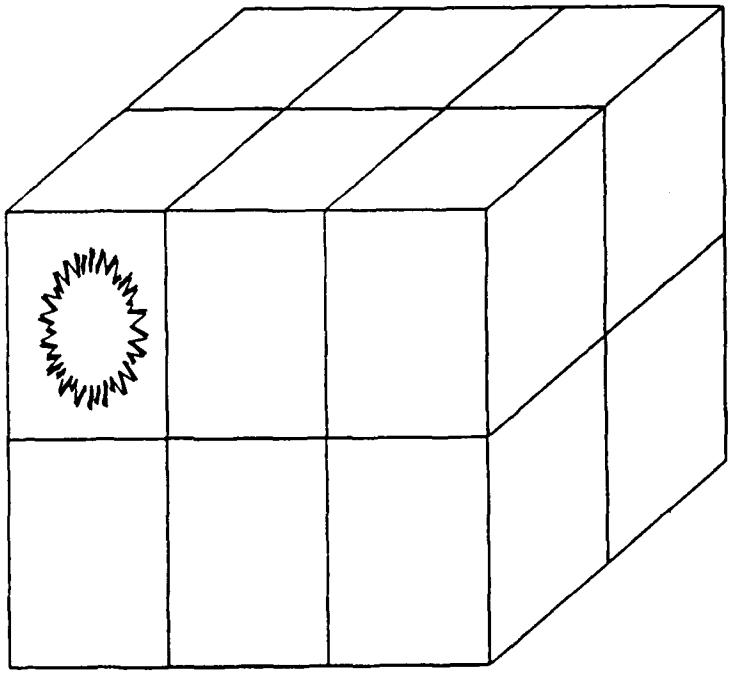
Software and Hardware

The software that enables the sharing of the computer workspace is MMConf, a conferencing program supporting a variety of applications. MMConf was developed by BBN Systems and Technology. The software to control voice and video currently operate independently of MMConf. Audio and video data is essentially handled in a multiplexed fashion. Control software is responsible for voice and video connection management and for video camera and monitor control.

IV. References

Forsdick, H. "Explorations into Real-time Multimedia Conferencing," Proceedings 2nd International Symposium on Computer Message Systems, pp. 299-315 (Sept 1985).

Local Area Decision Net



Converse

I. System Information

Name: Converse

Organization: Carnegie-Mellon University

Category: Local Area Decision Network

Cost: Not a commercial product

Contact Name: Mike Blackwell
Carnegie-Mellon University
Schenley Park
Pittsburgh, Penn. 15213

Telephone: (412) 578-2272
Email: Mike.Blackwell@rover.ri.cmu.edu

II. Background

Objective
The objective of Converse is to provide alternatives to traditional synchronous face to face meetings.

History
This product has been used in some very fundamental studies conducted on small group behavior at CMU. Some of the objectives of the studies listed below in the reference section include the social/psychological impacts of using electronic meeting systems, vs. the traditional face to face meeting style.

Future Outlook
The system is very rudimentary in terms of sophistication compared to other group meeting software available today. Currently it is probably not robust enough to support large group meetings.

III. Characteristics

Tasks Supported
The system supports group meetings using electronic communication media.

Facility
The system can be hooked up to a DEC mainframe computer.

Procedures and Facilitation
Converse is an interactive software program for on-line synchronous communication which is similar to the Phone Utility on DEC VAX computer. Converse splits the computer screen into

windows with one window for each group member. This allows each person to read the message he/she is sending as well as other group member's messages, along with their names. The standard version of Converse can support up to three persons to communicate with each other. Each window scrolls independently so that group members can read/enter messages simultaneously. Messages are sent automatically the instant they are entered. No facilitation is necessary.

At times, Converse has been modified to meet different research needs. For Example, group member's names are removed to maintain user's anonymity. It should be noted that messages on this system cannot be entered simultaneously. The cursor serves as a baton in such a manner that only the window with the cursor is allowed to enter messages. If someone else is holding the cursor, the member who wishes to enter a comment needs to press the control key. This key has been designated to signal the one who is currently holding the baton. The user holding the baton then decides whether to pass control to the other group member.

Software and Hardware
The technical equipment includes a DEC mainframe computer system, with associated terminals that can be distributed in any physical layout desired.

IV. References

Kiesler, S., Siegel, J., McGuire, W. "Social Psychological Aspects of Computer-Mediated Communication." American Psychologist, 39:10, 1984.

Siegel, J., Dubrovsky, V., Kiesler, S. "Group Processes in Computer-Mediated Communication." Organizational Behavior and Human Decision Processes, 37, 1986.

McGuire, T., Kiesler, S., Siegel, J. "Group and Computer-Mediated Discussion Effects in Risk Decision Making." Journal of Personality and Social Psychology, 52:5, 1987.

Coordinator

I. System Information

Name: The Coordinator

Organization: Action Technologies

Category: Local Area Decision Network

Cost: $995 for LAN with 10 users
$1990 for LAN with 30 users
$495 for stand-alone versions
$100 for hub software for connecting remote LAN's

Contact Name: Jack Clag
Action Technologies
2200 Powell St., Suite 1100
Emeryville, CA 94608

Telephone: (415) 654-4444
(800) 624-2162 (technical assistance and sales information)

II. Background

Objective
Designed to allow organized information exchange between members of an electronic workgroup. The coordinator assumes that the user's goal is to maintain conversations about ongoing issues, tasks, and responsibilities. It allows people to schedule a meeting, but doesn't provide any structuring for the actual meeting.

III. Characteristics

Tasks Supported
Coordinator uses a sophisticated E-mail system to facilitate electronic communication among workgroup members.

Facility
Facilities may vary. No specific facilities are required since it isn't designed to support physical meetings. Each user of the system needs to set up an account on a local area network so they can receive mail and have their calendar updated. Versions for IBM compatible and Macintosh are both available. The only requirements are that they support the LAN requirements set forth in the "Software and Hardware" section.

Procedures and Facilitation
The system uses menu driven features to add structure to electronic conversation. In this sense it is more restrictive

than the traditional E-mail system where free-form messages are sent back and forth between participants. The menu system allows responses to be categorized in a number of ways, e.g. clarification, rejection, alternative proposal. The system also keeps records of the entire interaction.

The system is designed, on a group dynamics level, to change the way people will interact during their work. It is based on the concept of records providing a context or history for each conversation. Mechanisms are provided which allow commitments to be made, and a calendar system to track these commitments. In this sense the system is integrating techniques in organization behavior modification in an attempt to improve the productivity of the group using the system.

The system places messages in the individual's PC, as opposed to remaining in the server. This system has the advantage of allowing users to access the files quickly in their own PC. However, a potential problem crops up since the users cannot access the systems without their PC.

Coordinator seems best suited for people who are geographically dispersed and who must work on a project together. If different machines and systems are used in each location, or someone needs to travel, a modem allows connections with the rest of the organization. As its name implies, the primary benefit from the system is scheduling tasks and responsibilities, and updating the status of ongoing and interdependent actions.

Software and Hardware
The product requires a LAN server with 640K bytes of RAM, Novell's Advanced netWare (version 2.0 or higher), or a LAN operating system that fully supports DOS 3.1 or higher.

IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282.

Also see technical literature provided by system developer.

ForComment

I. System Information

Name: ForComment

Organization: Broderbund Software, Inc.

Category: Local Area Decision Network

Cost: $995 for network/workgroup version
$295 for individual user station version

Contact Name: Broderbund Software, Inc.
17 Paul Dr.
San Rafael, CA 94903

Telephone: (800) 527-6263
(415) 492-3200

II. Background

Objective
The goal of the system is to facilitate collaborative writing.

History
The concept for this system was developed by professors Mark Edwards and Jim Levine, who were dissatisfied with current techniques in collaborative research and other writing intensive duties. They later brought in Midian Kurland, a cognitive psychologist for further input on sketching the product outline

III. Characteristics

Tasks Supported
ForComment is a document-editing package that supports up to 16 users at a time.

Facility
The system can be used for the production of a collaborative document in any environment that can support multiple people using one PC, or many people operating in a LAN environment.

Procedures and Facilitation
ForComment allow multiple reviewers to comment on a given document, appending additional insights to other's comments. This process is done without touching the original text in any form. The only person who can alter the original is the designated author, who can incorporate comments from participating members at his own discretion. Additionally, the remarks added by contributors are indexed by the person who wrote them, allowing for easy identification of sources. The system

incorporates menus and context-sensitive help screens to support user activities. Although the system works well on a single system, a LAN environment is suggested.

Software and Hardware
The software runs on the IBM PC or IBM compatibles. At least 384K bytes of RAM are necessary. An independent wordprocessor is also necessary for using ForComment. The program is compatible with most popular word processing programs on the market today.

IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282.

Also see technical literature provided by system developer.

Higgins

I. System Information

Name: Higgins

Organization: Conetic Systems Inc.

Category: Local Area Decision Network

Cost: $995 per server for up to 20 users
$995 additional for unlimited users

Contact Name: Conetic Systems Inc.
1470 Doolittle Drive
San Leandro, CA 94577

Telephone: (415) 430-8875
Fax: (415) 632-8925
Telex: (415) 510-601-7680

II. Background

Objective
The objective of the system is to increase communication efficiency among workers, to assist in monitoring company-wide activity, and to assist in the low-cost transfer of data among employees and customers

III. Characteristics

Tasks Supported
Higgins supports scheduling, personal calendaring, data retrieval, and project tracking. Additionally, Fax and E-mail are used for a non-verbal communication.

Facility
No true facility exists for this system, since it can be installed in almost any organization. However, there are substantial hardware and software requirements listed below.

Procedures and Facilitation
Higgins is a traditional LAN-based workgroup productivity software. It is built around a relational database that gives each user keyword access to group calendars, shared project information, and a personal filing system. It includes standard features like E-mail, scheduling, and project tracking, as well as expense reporting plus accessories. These accessories include a calculator, notepad, and telephone dialer. Two levels of password protection and full encryption of all text files keep data secure.

The system also has a new feature, a transparent, menu-driven facsimile delivery for E-mail. This allows users to select a name from their previously specified personal directory, and recipients who are not on the E-mail listing can receive the message as a Fax. The system also creates a cover page (listing attributes of the document such as sender, recipient, subject, etc.) which is attached to message.

Software and Hardware
The product require an IBM PC Network-compatible LAN, including 3Com's 3+, Novell's Advanced NetWare, Banyan's Vines, IBM's Token Ring, and AT&T's StarLAN.

IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282

Also see technical literature provided by system developer.

LIfE

I. System Information

Name: LIfE

Organization: Motorola Computer Systems

Category: Local Area Decision Network

Cost: $1195 for LIfE-Forms and LIfE-Lines
$795 for LIfE-Plans
$2000 for LIfE-Works for one to eight users

Contact: Motorola Computer Systems
10700 North De Anza Blvd.
Cupertino, CA 95014

Telephone: (408) 255-0900

II. Background

Objective
Motorola's Linked Information Environment (LIfE) is a system of integrated software applications designed for the special needs of workgroups-people who depend on one another for accurate, up-to-date information and cooperative teamwork.

III. Characteristics

Tasks Supported
These products from Motorola Computer Systems come in four modules; the total effect being to automate paperwork, data entry, "what-if" analysis, and communication.

Facility
None of the above software products require a particular physical meeting location. All that is necessary is listed below under hardware/software requirements.

Procedures and Facilitation
LIfE-Forms is designed to allow workgroup users, without extensive training, to quickly implement form-based procedures. LIfE-Forms can help MIS professionals to quickly respond to requests from end-user departments, thereby better managing the MIS workload. Electronic forms can be used to automated existing manual, paper-based procedures. They can also be used to implement new applications where information needs to be captured and stored for subsequent processing and retrieval. In essence, this module facilitates paperwork, such as purchase orders, billing, employee forms, and tax records.

LIfE-Plans is a fully featured spreadsheet, compatible with key sequences and formulae of Lotus 1-2-3. It contains several features to import, query, update, and export data from numerous sources-databases, spreadsheets, word processors and others. LIfE-Plans is particularly useful in providing graphing, reporting, and analysis of workgroup data captured with LIfE-Forms and LIfE-Works. Any ASCII file with specified delimiters, such as dBASE CSV file, can also be imported. When PC-Interface is used, a 1-2-3 ".wks" or ".wks1" spreadsheet can be retrieved without specifying an import or export operation. The "Query-By-Form" (QBF) function of LIfE-Forms allows a set of data resulting from a query to be sent to LIfE-Plans.

LIfE-Lines is a workgroup E-mail system. It is designed to work in conjunction with the other members of the LIfE family of workgroup products, in particular LIfE-Forms and LIfE-Plans. The availability of these products in a network of workgroup systems provides a foundation for the implementation of cooperative applications in an organization. LIfE-Lines allows forms and spreadsheets, plus documents and any other system files, to be routed across a network of systems. The mail network can be constructed of Local Area Networks, Wide Area Networks, or both. Use of the registered mail and extended tracking features allow the sender to monitor the status of items sent.

LIfE-Works is a "new generation" data capture product built on over 16 years of application experience. Its capabilities range from batch-oriented data entry to sophisticated transaction processing. Designed with an "open architecture", LIfE-Works is the first product to fully integrate data capture, database, networking, print, office, and analysis software. The product provides a cost effective alternative to "pure" centralized or decentralized data capture and processing. Powerful networking products allow integration with established networks of corporate mainframes, PCs and other workgroup systems-thus providing the full benefits of "distributed processing." Additionally, local users (without requiring MIS resources) can automate workgroup activities through use of relational database analysis tools and office automation software. Essentially this system offers high-end data entry for back-office activities.

Software and Hardware
All of the above products require Motorola hardware and the Unix operating system. The requirement for the specific systems is as follows:

LIfE-Lines requires the Motorola System 8000 with Release 3 Version4, or later, of the UNIX SYSTEM V/68 operating system. The Line Printer Support System (LPSS) is required for printing.

LIfE-Plans runs under UNIX SYSTEM V, Release 3 Version 4 or higher. The product also requires the Line Printer Support System as the printer interface.

LIfE-Forms will operate on any Motorola System 8000 with 4 Megabytes of memory and Release 3 Version 4, or later, of the UNIX SYSTEM V/68 operating system. The Line Printer Support System is required for printing.

LIfE-Works requires UNIX SYSTEM V, Release 3. Also required is the System 8000 computer.

IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282.

Also see technical literature provided by system developer.

Office Works

I. System Information

Name: Office Works

Organization: Data Access Corp.

Category: Local Area Decision Network

Cost: $1395 for LAN version
$195 for single user

Contact: Data Access Corp.
14000 Southwest 119th Ave.
Miami, FL 33186

Telephone: (305) 238-0012

II. Background

Objective
The objective of the system is to automate everyday office activities.

III. Characteristics

Tasks Supported
The system supports the handling of phone communication, calendaring, and electronic communication.

Facility
No true facility exists for this system, since it can be installed in most any organization with the proper hardware and software.

Procedures and Facilitation
Office Works can send and receive messages across a network. For communication outside the network, Office Works provides for the transmission of ASCII files by Telex, Fax, or postal service. Meeting information, names, addresses, and phone numbers can all be managed and shared among users, helping make more efficient use of time.

Efficient time management is also facilitated with daily, weekly and monthly calendars which keep track of appointments and lets the user set up meetings through the system. Graphic displays of appointments show the user open times and appointments at a glance. Group scheduling is made possible through a group calendaring system, allowing one user to scan other user's schedules for least conflicting times and write in the appointment time.

Messages from phone calls, if taken by others in the department, can be sent to the appropriate person's terminal with a "Message Waiting" tag. Responses can be sent using the user's favorite wordprocessor, which is accessible throughout the system.

Finally, the system includes a completely searchable name, address, phone, and company-information database for clients, vendors, and business contacts.

Software and Hardware
The system requires an IBM PC, XT, AT, or compatible with 640Kbytes of RAM and 2.5 megabytes of disk storage. Support is provided for multiuser compatible operating systems, including Novell Advanced NetWare 2.0 and higher, 3Com 3+ version 1.1 and higher, IBM PC Network/LAN Program 1.12 and higher, IBM Token Ring/LAN Program 1.12 and higher, and other NetBIOS-compatible networks.

IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282.

Also see technical literature provided by system developer.

Syzygy

I. System Information

Name: Syzygy

Organization: Information Research Corporation

Category: Local Area Decision Network

Cost: Not available

Contact: Not available

II. Background

Objective
The purpose of the system is to help people manage activites, resources, and budgets.

History
Information Research is a privately held subsidary of Sprigg Lane Investment Corporation, an investment comany with a wide range of holdings. A new company, Information Research has marketed a management software product called Action Tracker since 1987. Syzygy is a groupware product that the company has recently developed. A version of the product that can run on IBM PCs will be available soon, and a Macintosh version of the product will be available in 1990.

III. Characteristics

Tasks Supported
The system combines calendar and project management applications with an electronic mail program.

Facility
Syzygy will be able to run on LANs with common IBM PCs and Macintosh machines.

Procedures and Facilitation
Syzygy structures conversations among users to support communication. A forms-driven input model is used to implement the conversational structure in a manner that is not overbearing for the user.

Software and Hardware
The system will be available with IBM PC and Macintosh formats. All versions of Syzygy will be able to run on one network. The Mac version of Syzygy will take advantage of the strengths of the Macintosh interface.

IV. References

Van Gelder, L. "Behind the Hype for Groupware," Lotus Magazine, May 1989, p. 70.

See technical literature provided by system developer.

WordPerfect Office

I. System Information

Name: WordPerfect Office

Organization: WordPerfect Corporation

Category: Local Area Decision Network

Cost: $495 for file server
$150 for each additional station

Contact: WordPerfect Corporation
1555 North Technology Way
Orem, UT 84057

Telephone: (801) 225-5000

II. Background

Objective
The purpose of the system is to provide support for office automation and increase worker productivity.

History
WordPerfect Office, WPCorp's first office automation package for PC LANs, is now being shipped. Designed to increase productivity, WordPerfect Office streamlines inter-office communication by allowing network users to exchange mail, phone messages, and appointment schedules.

WordPerfect Office grew from user demands -- specifically, requiems by the U.S. Department of Justice, which was interested in an enhanced version of WordPerfect Library for use with its Data General Library operating on Data General hardware. That, coupled with continued user requests for a multiuser version of WordPerfect Library, led to the current personal computer version. Future versions will have greater connectivity capabilities.

III. Characteristics

Tasks Supported
The system supports electronic Mail, scheduling, calendaring, and notetaking.

Facility
This LAN application can run on most network systems that support DOS filelocking features. Thus, the facility can vary as long as it can support a LAN system.

Procedures and Facilitation

A number of features are incorporated into WordPerfect Office. The Mail program in WordPerfect Office displays In and Out boxes on a "mailbox" screen. The mailbox contains messages, letters, or files that can be sent to any network user. Each recipient receives on-screen notification when a message arrives and the sender can see when a message has been opened or deleted. To safeguard confidential information, WordPerfect Office has multilevel security with password protection. A convenient Phone Message feature comes with the mail to efficiently record phone messages on the screen, eliminating the need for easy-to-lose message sheets.

Using features from the Calendar program, the Scheduler in WordPerfect Office will coordinate appointment schedules for users. A person organizing an event can specify a date, time, and place, and the Scheduler will examine the calendars of users involved and post "open times" during which an event can be scheduled. Notification features are also available for selected meeting times.

Information, notes, names, and addresses can be organized into a flat-file database using the Notebook program in WordPerfect Office. Notebook files can then be used as secondary merge files with WordPerfect for use in generating labels or form letters. Notebook records can be edited, sorted alphanumerically, and displayed in any order. Users can also use the Notebook program to create a telephone directory. With the help of a modem (Hayes or compatible), Notebook can dial telephone numbers.

File Manager will organize program and data files on both local and network directories. users can move, copy, rename, or view any file. The Program Editor and Macro Editor are powerful tools for editing files and macros. An onscreen calculator program is also included.

Software and Hardware

DOS 3.0 is required for the WordPerfect Office document-locking feature. Each workstation requires 384K bytes of RAM.

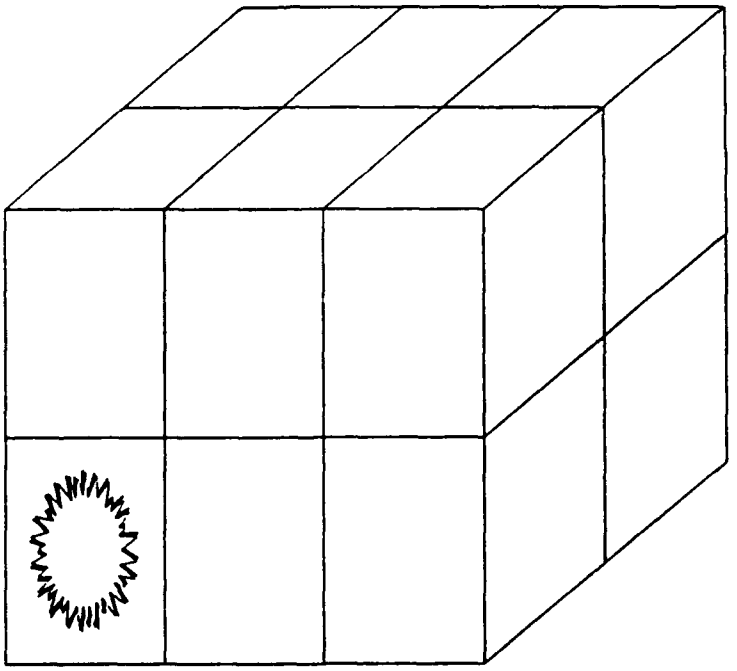
IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282.

WPCorp Report VolumeII, Number 3. Published by WordPerfect Corporation. October 1988.

Also see technical literature provided by system developer.

Computer Conference



Caucus

I. System Information

Name: Caucus

Organization: MetaSystems Design Group, Inc.

Category: Local Area Decision Network, Computer Conference

Cost:
$350 for PC version
$1,000 for SCO Xenix 286 for 8 users
$1,800 for SCO Xenix 386 for 16 simultaneous users
$1,800 for Novell LAN systems with up to 15 users
$4,000 for Novell LAN systems with 16+ users
$4,000 for low-end minicomputer systems
$7,500 for mid-range minicomputer systems
$10,000 for high-end minicomputer systems
$15,000 for mainframe computer systems

Contact Name: MetaSystems Design Group, Inc.
2000 North 15th St., Suite 103
Arlington, VA 22201

Telephone: (703) 243-6622

II. Background

Objective
The objective of the system is to allow meetings to be held and workgroups to function outside of the traditional domain of face to face meetings.

Future Outlook
The outlook for most computer conferencing systems seems promising. This is especially true in the domain of technological meetings, where the dynamics associated with face to face meetings are not as important to goal achievement.

III. Characteristics

Tasks Supported
Workgroup support, with the additional benefit of allowing for asynchronous meetings to occur are the prime benefits of conferencing systems like Caucus.

Facility
No true facilities are needed for systems such as these. The only requirements are found in meeting the "Software and Hardware" requirements listed below.

Procedures and Facilitation

Caucus is probably the most powerful of those computer conferencing products designed to run on small computer systems. Computer Conferencing systems are one of four major types of computer communications packages. The other three are mail, electronic bulletin boards, and document editing systems. A computer conferencing system differs from the other three systems in that in allows for many people to share in a discussion synchronously or asynchronously.

One example of Caucus use is by The Defense and Space Systems Integration Group at Boeing Computer Services in Seattle for on-line meetings. Meetings done through Caucus have the benefits of direct links to a database providing for technical and other information for the systems users. In addition, a built-in dictionary system allows users to stay up to date on technological jargon, while at the same time allowing the user interfaces to be easily translated into foreign languages. These meetings also have the additional obvious benefit of having a total recording made of all transactions.

Software and Hardware

Caucus 2.1 is available for most of the popular operating systems and LANs, including Unix, Primos, VMS, AOS, Xenix, Novell, and 3Com. Computers being used as hosts for Caucus networks include DEC, Hewlett-Packard, Prime, Sun, Data General, AT&T, IBM, NCR, Ground, Unisys/Sperry, and Plexus. For the IBM PC or 100 percent-compatible the minimal requirements are *MS-DOS 2.0 or* higher, complete with a 20-megabyte hard disk drive.

IV. References

See technical literature provided by system developer.

Cosmos

I. System Information

Name: Cosmos

Organization: Several participants including:
British Telecom
Computer Sciences Company, Ltd.
Queen Mary College
University of Manchester
University of Nottingham

Category: Computer Conference

Cost: Not a commericial product

Contact Name: Paul Wilson
Computer Sciences Company, Ltd.
Computer Sciences House
Brunel Way
Slough SL1 1XL
United Kingdom

Telephone: 0753 73232
Email: wilson@cs.nott

II. Background

Objective

The Cosmos project is aimed at designing "a new breed of system to support the group work process." A key design approach is to base the functionality of the system on a thorough understanding of how people communicate.

History

Cosmos is a British sponsored project being developed in the field of Computer Supported Co-operative Work (CSCW). Funded with 1.4 million pounds from the Alvey Programme, the purpose of the project is to research structured communication via messaging systems and develop a system that is at the forefront of the CSCW field. Both commercial and university interests are participating in Cosmos (see above). The participants view Cosmos not only as an end in itself, but also as a vehicle for gaining experience with CSCW technology.

Currently the system is still under development. While Cosmos is presently not available for commercial use, the project has generated a substantial body of research related to CSCW. Updates on the progress of Cosmos are discussed in a "Cosmos Information Exchange Network" newsletter that is mailed out three times a year to key international researchers in the CSCW field.

Cosmos was initiated in May 1986 and was originally conceived as a three year program. The first year of the project was

primarily investigative. During this period a design framework was established. In the second year the project team focused on designing and building a prototype. During the third year, the team was involved with building and evaluating the prototype Cosmos system.

Throughout the project, the developers have focused on five major areas of research: 1) Communication tasks, 2) Communication structures, 3) User interface, 4) Systems, and 5) Evaluations.

Future Outlook
Various components of the Cosmos system are currently being prototyped and tested. No completion date for the system is available.

III. Characteristics

Tasks Supported
Cosmos is designed to support a variety of group tasks such as meetings, project work, and company procedures.

Software and Hardware
The Cosmos architecture is designed as a set of layered software modules based on a client-server model, where each server interface performs a set of basic and specific services. The servers are designed to be implemented as separate processes managing resources that can be shared among client processes.

The message delivery service, which takes coordinates the inflow and outflow of messages, has been built and was tested in late 1988. A directory service based on the INCA "Quipu" public domain software is also being developed. The CCITT standard of X.500 will be utilized. The early prototype of Cosmos user interface has been designed on a Sun workstation using "NeWS." An interface for PC-compatible machines will be developed at a later time.

IV. References

Cosmos Information Exchange Network newsletter, March 1988.

Cosmos Information Exchange Network newsletter, Fall 1988.

Also see the following papers appearing in Research into Networks and Distributed Applications, Proceedings of Euteco 1988, R. Speth (editor), April 1988, Elsevier Science Publishers, (ISBN 0444 70428 0).

"The Cosmos Project: A Multi-Disciplinary Approach to Design for Computer-supported Group Working," Wilbur and Young.

"Structured Computer-mediated Communications in Cosmos," Bowers et al.

EIES, EIES2, TEIES

I. System Information

Name: EIES (Electronic Information Exchange System), EIES2, TEIES (Tailorable EIES)

Organization: Center for Information Age Technology
New Jersey Institute of Technology

Category: Computer Conference

Cost: See summaries on each system below

Contact Names: Starr Roxanne Hiltz
EIES Project Director

Murray Turoff
TEIES Project Director

Center for Information Age Technology
New Jersey Institute of Technology
Newark, New Jersey 07102

Telephone: (201) 596-3437

II. Background

Objective
The goal of the EIES work at NJIT has been to develop computer conferencing systems to facilitate communication among geographically dispersed groups of people who need to communicate cheaper, faster, and more productively than with telephone, mail, and conventional meetings.

History
The New Jersey Institute of Technology (NJIT) is the public technological university of New Jersey. The EIES projects at NJIT have been developed through a university based laboratory called the Computerized Conferencing and Communications Center. The Center has been in operation since 1975, and is dedicated to developing and evaluating computerized conferencing technology. The goal of the Center is to perform service and research -- not to turn a profit. Since the inception of the Center, NJIT has been a leader in the research and development of computer mediated communication.

The specific objectives of the Center are: 1) to develop new software and technology to support group communication trials, 2) to prototype new applications and/or new developments of the technology in application trials, and 3) to evaluate and understand the consequences of design alternatives and specific applications on individuals, groups, and organizations.

The Center has worked with a variety of industry partners

including the New Jersey Office of Telecommunications and Information Systems, Computer Sciences corporation, AT&T, IBM, and the New Jersey Commission on Science and Technology.

Since the inception of EIES fourteen years ago, three primary versions of the system have been developed: EIES, EIES2, and TEIES. The original EIES is still being widely used. The later two systems are currently being used by NJIT and other selected organizations and are scheduled to be available to other organizations by Fall 1989. In the following sections we will provide a summary of each version of EIES.

III. Summary of EIES

History

EIES is the first computer conferencing system that was developed at NJIT. The design goal of EIES was to use the abilities of the computer to facilitate human communications. Throughout its life EIES has served a dual function of aiding communications among users and acting as a research vehicle for NJIT.

EIES is a mature system, with 2000 users who utilize it for communication needs and as an electronic classroom. A wide variety of groups use the system including those who are employed by DEC, Hewlett-Packard, 3M, Harvard, Stanford, NASA, the Army, and the U.S. Dept. of Commerce. Users gain access to the system by buying memberships from NJIT. All users must agree to participate in the Center's research program. Memberships are allotted based on the potential value of the user group's EIES application to the Center's ongoing research. Prices for using EIES are listed below:

Individual Membership:	$ 60 per month / account
Organizational Membership:	$ 150 per month plus $ 10 per month / account plus $ 4-8 per hour of use

Other charges include: remote connect surcharges, remote printing charges, online data storage, software development, and other network charges.

Characteristics

EIES provides the following five capabilities: 1) electronic mail, 2) electronic conferences and meetings, 3) notebooks and databases, 4) word, text, and document processing, and 5) custom-designed communication structures.

EIES is a fixed-capacity resource that runs on a Perkin-Elmer host computer operated by NJIT. To utilize EIES, users must connect to the NJIT computer facility. EIES supports electronic messaging, conferencing, personal notebooks, text editing, and document preparation. It includes a multitude of specialized features such as voting, automated questionnaires, and data gathering to facilitate group communication processes. The

system has five types of human machine interfaces, ranging from simple menus for the beginning and casual user, to self-defined user commands and procedures fro customized tailoring of the interface.

Future Outlook
To date, the EIES program has had widespread recognition and international participation. The new versions of EIES are expected to be ready for external organization by Fall 1989. Since the new versions represent enhancements to the original EIES, it is possible that the newer versions of the system will eventually supersede the original EIES.

IV. Summary of EIES2

History
EIES2 is the second generation of EIES computer-mediated communications system. EIES2 has been under development since 1984. Unlike the original system, EIES2 is a distributed and decentralized system with machine independence. Its implementation design ensures that EIES2 can be used with microcomputers, word processors, minicomputers, and large-scale computers to provide access to communications systems of the future. This will allow the EIES technology to move out from under the wing of the NJIT computer facility and be integrated into a variety of organizational computing environments.

EIES2 nodes have been installed at NJIT, the University of Medicine and Dentistry of New Jersey, and the Jutland Institute of Technology. The system is currently in use at NJIT for project coordination and electronic class room applications. EIES2 will be made available to other organizations by Fall 1989.

The tentative prices for EIES2 are listed below. Educational institutions receive a 50% discount. Updated prices may be obtained by contacting NJIT.

Lifetime Lease for one machine or 500 users:	$ 10,000
Each additional machine or 500 users:	$ 5,000
Maintenance:	10% per year
Enhancements:	10% per year

Characteristics
The core of EIES2 is a high-level, object-oriented pseudo-machine which applies principles from the programming languages ADA and Smalltalk. The system employs a distributed, communications-oriented database. The system has evolved to provide an easy to use interface plus advanced features to satisfy both new and experienced users.

EIES2 currently runs on the UNIX operating system networking over TCP/IP networks. The system has also been demonstrated over ISO, UUCP, and simple asynchronous line networks. EIES2 operates on equipment from Hewlett-Packard, DEC, Sun Microsystems, and AT&T.

Future Outlook
The new research and development associated with EIES2 represents a long term commitment of NJIT to remain at the leading edge of computer-mediated conferencing system technology. Recent advances in the EIES technology may make the system more attractive to potential participating organizations.

V. Summary of TEIES

History
The acronym TEIES stands for Tailorable EIES. It is a conferencing system similar to EIES2. One major difference is that TEIES has been developed for the IBM environment, while EIES2 is oriented to the UNIX operating system environment. TEIES is being developed under a joint study contract with IBM, and partially financed by the New Jersey State Commission on Science and Technology.

Beta testing for TEIES is being completed at this time and the system will be available for purchase by Fall 1989. The tentative prices for TEIES are the same as those listed for the EIES2 system.

Characteristics
A distinguishing feature of TEIES is its major emphasis "tailorability." The system supports a wide variety of specialized communication structures. Also, all interface, help, and documentation material may be modified or replaced by the operating organization to tailor the system to their specific needs and the characteristics of their user population. The system is designed to be easily integrated with other information and computer-based services with no additional training for local application programmers.

Future Outlook
See comments for EIES2 (above).

VI. References

Hiltz, S.R. "The Virtual Classroom: Building the Foundations," The Journal of Communication, Spring 1986.

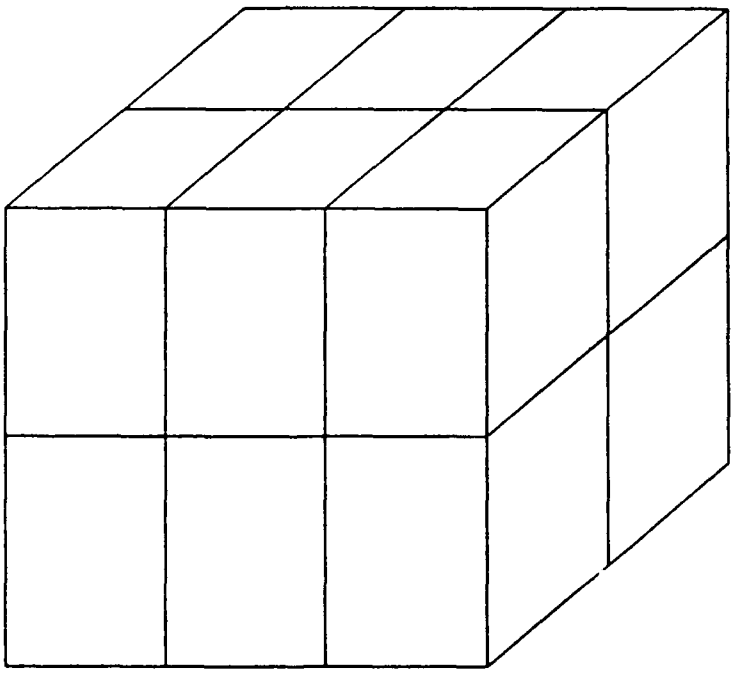
Turoff, M. and S.R. Hiltz. "Computer Support for Group versus Individual Decisions," IEEE Transactions on Communications, January 1982, pp. 82-91.

Turoff, M. and S.R. Hiltz. "Structuring Computer-Mediated Communication Systems to Avoid Information Overload," Communications of the ACM, July 1985.

Turoff, M., Foster, J., Hiltz, S.R., and Ng, K., "The TEIES Design and Objectives: Computer Mediated Communications and Tailorability," Proceedings of the Hawaii Internatinal Conference on Social Sciences, January 1989.

Also see technical literature provided by system developer.

Miscellaneous



Agenda

I. System Information

Name: Agenda

Organization: Lotus Development Corporation

Category: Miscellaneous (an information manager for an individual user)

Cost: Contact Lotus for estimate

Contact: Lotus Development Corporation
61 Medford Street
Somerville, MA 02143

Telephone: 1-800-426-7682

II. Background

Objective
The objective of this single-user system is to help collect and organize free-form textual data such as personal notes, ideas, appointments, phone calls, and addresses.

History
Agenda is a product made by Lotus Development Corporation. Lotus is the originator of "1-2-3," the extremely popular spreadsheet program for PCs. Agenda was released in 1988 and is described in company literature as a "personal information manager." While the product was built for single users, it has indirect application as a form of groupware, since it can be used to help to coordinate group activities. Agenda has received the following favorable reviews from industry publications: Most Important Product of 1988, PC/Computing; Best New Idea of 1988, InfoWorld; Best of 1988, PC Magazine.

III. Characteristics

Tasks Supported
Agenda helps a person to arrange and manage information that is generated throughout the course of daily business operations.

Facility
No facilities are necessary since this is a single user product.

Procedures and Facilitation
There are three main concepts associated with running the Agenda software: items, categories, and views.

1) Items: Items are typed entries that cannot be longer than 350

characters. Items are generally summaries of a message, event, task, etc. Each item can have a note attached to it. A note can be up to seven pages long and be in the form of a letter, electronic mail message, scanned text, or data imported from other computer applications.

2) Categories: The category manager is used to organize the items. A user can define custom category topics or can utilize categories that are predefined by the program. When entered into the system, items can be assigned to one or more categories. Hence, Agenda allows information to be filed in more than one place at a time.

3) Views: The information that is input into Agenda can be viewed in a variety of ways. The different views are defined by the user.

Software and Hardware
Agenda runs on IBM PCs and compatibles. The software incorporates some Artificial Intellegence techniques to support information recovery.

IV. References

Strassman, P. "Someday I'll Get Organized," INC., December 1988.

See technical literature provided by system developer.

MindSight

I. System Information

Name: MindSight

Organization: Execucom

Category: Miscellaneous (decision support for an individual user)

Cost: Contact Execucom for estimate

Contact: Execucom Systems Corporation
Arboretum Plaza One
9442 Capital of Texas Hwy, North
Austin, Texas 78759

Telephone: (512) 346-4980

II. Background

Objective

The objective of this single-user system is to provide business people with direct access to computers for information, problem-solving, and decision-making.

Future Outlook

The system is designed to be run on Macintosh computer systems. Thus, the success of the system will hinge not only on its own merits, but also on how readily corporate businessmen (for whom the system is designed) adopt this type of hardware.

III. Characteristics

Tasks Supported

MindSight provides for the solution of a number of different tasks involved in typical everyday decision-making including:

* The capability to write models in easy to understand terminology
* What-if and Goal Seek interrogation
* Presentation-quality reports
* Consolidation of data
* Data files used to solve models and store solutions
* Many predefined functions and subroutines

Facility

No facilities are necessary since this is a single user product.

Procedures and Facilitation

MindSight allows the user to apply Spreadsheets, graphics, report

generators, and communications packages towards solving complex business problems. Inherent in the system are also financial functions which allow the calculation of rates of return, amortization tables, net present value calculation, compound growth rate depreciation, along with forecasting statistical functions. All of these features are combined in a package which is intended to allow the individual decision-maker to make quicker, and better choices. The system helps to prepare the results into a professional format.

Software and Hardware
Equipment required includes: Apple Macintosh, Mac XL, Mac Plus. 512K memory and an external drive are necessary. A hard disk is recommended. For Micro-Mainframe Communications, an asynchronous communications adapter is also necessary.

IV. References

See technical literature provided by system developer.

SuperSync

I. System Information

Name: SuperSync

Organization: SwixTech USA

Category: Miscellaneous ("Team Development")

Cost: $295

Contact: Tony Adams (Company President)
SuperSync
SwixTech USA
2102 Business Center Dr., Suite 130
Irvine, Ca 92715

Telephone: (714) 253-5715

II. Background

Objective
The goal of the system is to promote team development.

History
The system was developed by Tony Adams and his son Darryl Adams, a programmer currently attending school in California. The youngest Adams, Bryon, is currently attending the University of Arizona, and will probably join his father and brother in the business provided it is still having success in the market.

III. Characteristics

Tasks Supported
The system supports the following tasks:

- Analysis of significant group member interactions
- Survey group members for attitudes regarding other group members
- Analyzes groups for potential natural leaders
- Identifies informal lines of communication (lateral linkages)
- Prepares reports (hardcopies) regarding group member interactions

Facility
No actual facilities are necessary. The system is stand alone. The questionnaires can be printed out and administered to the group members to be analyzed in the privacy of their own office. Responses are then returned to the SuperSync consultant who feeds in the data for analysis.

Procedures and Facilitation
The function of the tool has caused it to be labeled groupware only in the loosest sense of the word. Only one person can actually use the tool at any given time, but the results are used to analyze groups. Supersync, which runs on most typical personal computers, has been purchased primarily by two classifications of buyers. First, it is used by organizational behavior consultants who have been retained by an company to come in and solve problems relating to personnel and work group productivity. The other type of buyer is one already working for the organization having these problems. Both situations, in terms of the sales of SuperSync, occur on a regular basis. The overall goal for both groups of users is the same, i.e. to improve the productivity of groups.

The basic intent of the software is to replace skip level interviews, opinion surveys and suggestion programs (all of which are aimed at improving people's productivity in groups by assessing attitudes, surfacing grievances, discerning who works well with whom, and discovering latent leadership) with a system that is easier to use and better able to assess these employee attitudes. High economies, in terms of time needed to make analysis, are claimed in consultants using SuperSync over the more traditional methods of data collection. The motivating factor for the development of such techniques, according to the SuperSync president, is to enable US companies to keep pace internationally with Countries which concentrate more resources towards managing their work team resources.

SuperSync is essentially a grouping algorithm which evaluates group members or potential group members for leadership, expertise, and the ability to work well together. The potential uses include selection of project teams, conflict resolution, organization design, and training in group dynamics and self management.

Two potential drawbacks are evident with the product. First, data of this nature (because of its sensitivity), if applied inappropriately, can cause more harm than good. If current group leaders find that their group members are going to others within the company for advice, emotional responses of resentment may occur, further reducing the groups effectiveness. The second drawback concerns the algorithm for determining how these factors are analyzed. The algorithm for SuperSync is not available to customers or consultants, for fear of product reproduction. While descriptions of the product's use give us some clues as to it inner workings, if important organizational decisions are to be based on its results, it seems important to know exactly what the results of the program are based on. This knowledge would allow the user to asses whether or not the product is truly appropriate for the organization.

Software and Hardware
The system can operate on IBM PC, XT, AT, S/2, and 100% IBM PC

compatible computers. A minimum of 512K of RAM is needed. It is recommended that the PC have one diskette drive and a hard disk or two diskette drives. Also needed is a text printer capable of printing the extended ASCII character set through character 255. A monochrome or color monitor can be used, although the color monitor is preferred. DOS version 2.0 or a later version is also necessary.

IV. References

Opper, Susanna. "A Groupware Toolbox", Byte Magazine, December 1988, pp. 275-282.

Also see technical literature provided by system developer.

Selected University of Arizona Publications

1. Applegate, Lynda M., "Idea Management in Organization Planning," unpublished doctoral dissertation, University of Arizona, 1986.

2. Applegate, Lynda M., Chen, Tsung Teng, Konsynski, Benn R., F. Nunamaker Jr., J.F., "Knowledge Management in Organizational Planning," *Journal of Management Information Systems*, vol. 3, no. 4, 1987.

3. Connolly, T., Jessup, L.M., Valacich, J.S., "Idea Generation in a GDSS: Effects of Anonymity and Evaluative Tone," under revision at *Management Science*, May 1988.

4. Dennis, A.R., Abens, T., Ram, S., Nunamaker Jr., J.F., "Communication Requirements and Network Evaluation Within an Electronic Meeting System Environment," Department of Management Information Systems, University of Arizona, March 1989, working paper.

5. Dennis, Alan R., Easton, A.C., Easton, G.K., George, Joey F., and Nunamaker, Jay F., "A Comparison of Ad Hoc and Established Groups in an Electronic Meeting System Environment," University of Arizona working paper, June 1989.

6. Dennis, A.R., George, J.F., Jessup, L.M., Nunamaker Jr., J.F. and Vogel, D.R., "Information Technology to Support Electronic Meetings," *MIS Quarterly*, vol. 12, no. 4, December 1988, 591-624.

7. Dennis, Alan R., George, Joey F., and Nunamaker, Jay F., Vogel, Doug R., "Automated Support for Group Work," in Morell, J.A. and Fleischer, M. (eds.), *Advances in the Implementation and Impact of Computer Systems*, 1989, forthcoming.

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